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Preface

This document is a user's guide for the Piping functionality of Intergraph Smart[™] 3D and provides command reference information and procedural instructions.

Documentation Comments

For the latest support information for this product, comments or suggestions about this documentation, and documentation updates for supported software versions, please visit *Integraph Smart Support (https://smartsupport.integraph.com)*.

What's New in Piping

The following changes have been made to the Piping task.

Version 2016 (11.0)

- The software now replaces missing catalog parts with Generic Piping Components during MDR operation. For more information, see *Generic Piping Component* (on page 196). (P1 CP:276211)
- You can now move or delete route objects at boundary connections maintaining the piping design intent. For more information, see *Appendix: Deleting at Boundary Connections* (on page 246) and *Appendix: Moving at Boundary Connections* (on page 234). (P2 CP:249685, P2 CP:267185, P2 CP:268379, P2 CP:264940, P2 CP:248568; P2 CP:300832)
- You can slide a branch leg along a header pipe run without disconnecting. For more information, see Move a branch (on page 107). (P2 CP:293434)
- You can now select a straight feature on a pipe leg, and move the straight feature to connect to an adjacent pipe leg. For more information, see *Move a set of pipe features* (on page 110). (P2 CP:300832)
- Added a new **Disconnect** command that allows you to disconnect route objects without disturbing the rest of the network. For more information, see *Disconnect* (on page 208). (P2 CP:293435)
- You can select a section of piping network using the new route selection commands. For more information, see *Route Selection Commands* (on page 100). (P1 CP:248690, P2 CP:293434, P1 CP:297357)
- The software treats field welds as breaks. In the Spool Generation dialog box, if you set Spool Break By Control Point to Break Only at Control Points, the spool also breaks at field welds. For more information, see Options Tab (Spool Generation Dialog Box) (on page 167).
- Added a new Quick Route → command that enables you to join two existing pipe segments. For more information, see Quick Route (on page 186). (P1 CP:248716; P1 CP:248717, P3 CP:288004)
- Removed Browse Instruments and Browse Piping Specialties options from Specify
 Component Tag dialog box > Component Tag list. Added Browse custom instruments
 and Browse piping custom specialties options to Insert Component ribbon > Type list.
 Using these new options, five of the most recently placed components are displayed in the

- drop-down list for selection when placing the same component in the model. For more information, see *Insert Component* (on page 134). (P2 CP:100106)
- The new Offset option on the Insert Tap ribbon specifies tap depth. For more information, see Insert Tap (on page 157). (P2 CP:147649)
- You can now create a specification break at a reducing component. For more information, see Create a specification break at a reducing component (on page 148). (P2 CP:223855)
- The new Review Component Placement command allows you to analyze the piping modeling process against reference data rules. For more information, see Review Component Placement (on page 214). (P2 CP:250334)
- You can now edit Port properties of on-the-fly specialty instruments. Added a new Port n category, Import Default Flange Properties and Drive Selection by Generic Port Data options to control the port properties. For more information, see Occurrence Tab (on page 272). (P2 CP:250490)
- Added a new locate filter, Construction Graphics. For more information, see Editing Properties (on page 116). (P2 CP:271166)
- Best practice examples are now available to guide you through general Catalog processes.
 For more information, see Appendix: Best Practices Reference Data and Catalog Change Management. (P3 CP:260389)
- You can now set the software to remember the last used working plane when routing pipe.
 For more information, see *Defaults Tab (Route Pipe Settings Dialog Box)* (on page 93). (P4 CP:258470)

SECTION 1

Piping

The Piping task is used to model distributed pipelines in your model using a point-by-point design method. Using the Piping task, you can create a fully rendered three-dimensional model of the various pipelines in your model. You also can use this task to insert piping components, instruments, and splits during design, and then to spool the pipe. You can start the Piping task by clicking **Tasks > Piping**.

Modeling of pipelines is aided by the piping specification, which limits and sometimes automatically selects piping parts. Within a particular design context or pipeline service, the specification author makes decisions in advance relating to both allowed parts and requirements for the parts that may be used in that service. Limiting the selection of parts through the use of a piping specification helps the designer by eliminating the need to make decisions related to applicability, cost, procurement, and safety of particular parts within particular pipeline services.

Part selection is further aided through the provision of rules regarding the usage of particular types of parts in particular design situations. The piping specification contains a grouping of piping materials classes that define the requirements, characteristics, and behavior of the piping commodities for a specific service. For more information on the piping reference data and piping specifications, see the *Piping Reference Data Guide* or the *Catalog Help*.

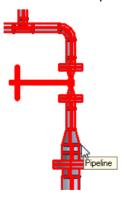
Before you start modeling, there are some relationships and concepts that you need to know.

Piping Systems

Piping systems are a way of organizing pipelines in your model. You can create piping systems based on the area where the pipelines are located, by what the pipelines carry, by the piping designer who models the pipelines, or by any other method that you choose. Piping systems are just a way to group objects. You can create piping systems in the Systems and Specifications task.

Pipelines

Pipelines are a way of organizing pipe runs in your model and are created in the Systems and Specifications task. You are not restricted to piping systems when creating pipelines. You can create pipelines under any previously created system. When you create a pipeline, you should define a fluid requirement and a fluid type.



Pipe Runs

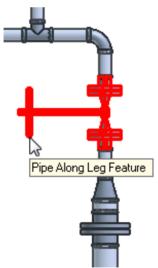
A pipe run is a connected series of pipe features that normally have the same nominal piping diameter (NPD) and flow direction, and are normally governed by the same pipe specification. All pipe features belong to a pipe run. One or more pipe runs make up a pipeline.



Pipe Features

When you route a pipe run, you place features defining high-level design information as you progress. The software automatically selects the specific parts based on the pipe specification of the pipe run. You may want to think of features as logical collections of parts driven by the pipe specification. There are several basic features: straight, turn, branch, end, run change, split, and along leg component.

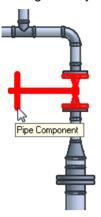
▶ NOTE Pipe specifications are defined in the piping reference data. You can create and customize the pipe specifications to suit your needs. For more information on defining pipe specifications, see *Piping Reference Data Guide*.



Pipe Parts

Parts are the physical components that compose a feature and are generally selected by the software. For example, flanges, gaskets, and the gate valve itself are parts that compose the gate valve feature. In special situations where the pipe specification does not select the part that you want, you can override the part selection by explicitly selecting the part from the catalog.

While this part does not follow the pipe specification defined for the pipe run, the part still belongs to only that pipe run.

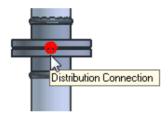


Pipe Ports

Ports are the connection points on the pipe parts.

Connections

Connections define how the pipe ports connect to one another.

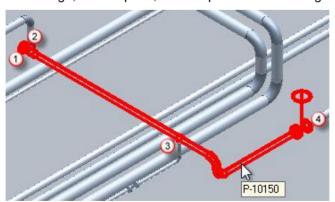


Pipe Leg

A leg is a group of route features routed in the same direction.

Boundary

A boundary is a port of the terminal object in a select set. Boundaries can exist at line change, run change, branch point, and at split. In the following example the pipeline has four boundaries:



The Piping task has the following commands:

_	
₽	Select - Used to select objects in the model. For more information, see <i>Editing Properties</i> (on page 116).
V	Route Pipe - Places pipe runs in the model. For more information, see Route Pipe (on page 50).
. ⊭	Insert Split - Places a welded split or a take-down joint in the selected pipe. For more information, see <i>Insert Split</i> (on page 124).
æ	Insert Component - Places valves, tees, and other in-line components in the selected pipe. For more information, see <i>Insert Component</i> (on page 134).
**	Insert Tap - Places a tap in the selected component. For more information, see <i>Insert Tap</i> (on page 157).
3	Generate Spools - Generates piping spools for the piping in the model. For more information, see <i>Generate Spools</i> (on page 165).
\$	Create Penetration Spools - Generates penetration spools for pipes that have penetration plates placed in the model. For more information, see <i>Create Penetration Spools</i> (on page 171).
ŝ	Sequence Objects - Renames the components of a pipeline or spool so that they are in a sequential order. For more information, see <i>Sequence Objects</i> (on page 175).
②	Group Pipe Parts - Automatically creates, names, and assigns piping objects to a Work Breakdown Structure (WBS) item. For more information, see <i>Group Pipe Parts</i> (on page 178).
**	Route Flex Pipe - Places flexible piping in the model. For more information, see Route Flex Pipe (on page 183).
Н	Quick Route - Joins two existing pipe segments in the model. For more information, see Quick Route (on page 186).
	Disconnect (Ctrl+Alt+D) - Disconnects a section of route network at boundary connections. For more information, see <i>Disconnect</i> (on page 208).
	Check Manufacturability - Analyzes pipes in the current workspace and reports the objects that will be difficult or impossible to manufacture. For more information, see <i>Check Manufacturability</i> (on page 216).
	Review Component Placement (Ctrl+Shift+E) - Allows you to view a route component's step-by-step interaction with reference data rules. For more information, see Review Component Placement (on page 214).

See Also

Deleting Pipe Objects (on page 120)
Moving Pipe Objects (see "Move Pipe Objects" on page 104)
Spooling (on page 163)

Permission Groups and Routing

Several users in different permission groups can work together when routing if you know how the software handles the different situations. Starting in version 6.0, Piping fully supports different users, with different sets of privileges, working on different runs such as when working in a Global Workshare Configuration.

Prior to version 6.0, pipe route legs could be shared between pipe runs. In version 6.0 and later, the software creates an Intermediate End Feature (IEF) at the end of a pipe run connected to another pipe run and creates a logical connection between the two IEFs/runs. The legs stop at the IEF and are no longer shared between pipe runs. You do not need to create a separate permission group for the pipe run and for the features of the pipe run. Everything can now be in the same permission group.

Assignment of Permission Groups

The first thing to know is how permission groups are assigned:

- Objects that you create directly are assigned to the active permission group.
- Objects created automatically by the software are assigned a permission group determined by an internal set of rules. The permission group assigned is not necessarily the active permission group. Examples of automatically placed objects include connections and a pipe automatically inserted when two touching valves are separated.
- Parts generated by features are assigned the permission group of the parent feature.
 Remember, however, that runs can be in a different permission group than its collective features and parts.
- End features use the permission group of the run to which they belong.
- Connections use the permission group of the parts to which they are connected. If the connection is between parts with different permission groups, then the permission group to which the user has write access is used. If the connection is between an equipment nozzle and a route part, the route part permission group is used for the connection.
- Piping connection objects (welds, bolt sets, gaskets, clamps) use the permission group of the connection that generated it.

Systems and Permission Groups

A system is a logical grouping of sub-systems. When you add or remove a sub-system, you are modifying the definition of the parent system. Therefore, you must have write access to the parent system. You do not need write access to the grandparent system. For example, to create a pipe run, you need write access to the parent pipeline. However, you do not need access to the system to which the pipeline belongs.

When participating in a Global Workshare Configuration, you must manage all permission groups at the host site. The sub-system requirement to have write access to its parent system is not possible if the sub-system's permission group is created at the satellite site, and the parent system's permission group is created at the host site.

For example, your host site is Houston and your satellite site is London. You create a system called "Pipe Rack 100" and its controlling permission group in Houston. You assign user John, who works in London, write access. During the workshare replication process, the "Pipe Rack 100" system and permission group is "duplicated" in London. In London, John can add columns,

beams, braces and whatever else he wants to the "Pipe Rack 100" system because John was given write access to the system's permission group in Houston. John cannot delete or change any of the properties of the "Pipe Rack 100" system in London because the host site, Houston, owns it. He can only "add" objects to the system. If John were to travel to Houston and log on there, he could delete or change any of the properties of the "Pipe Rack 100" system because the Houston host site owns it.

Example Configuration A

In this example, two users, John and Peter, are working on the same run with exclusive access. John is responsible for part of the run, and Peter is responsible for the other part of the run. Neither John nor Peter should be able to modify the work of the other person. The administrator should configure the permission groups as follows:

 Create three different permission groups: PG-Run, PG-John, and PG-Peter. Both John and Peter should have full control access to PG-Run. John should have full control access to PG-John while Peter should have read-only access to PG- John. Peter should have full control access to PG- Peter while John should have read-only access to PG- Peter.

The run should be created using the **PG-Run** permission group. When John works on his parts of the run, he should use **PG-John** as the active permission group. When Peter works on his parts of the run, he should use **PG-Peter** as the active permission group. The two halves of the run should connect at a component such as a valve (piping) or a union (electrical).

For example, John routes his part of the run, places a flange, and then places a gate valve. Peter then places a flange manually connecting to the open port of the gate valve, and then continues his part of the run.

Example Configuration B

In this example, two users, John and Peter, are working on different but in-line connected runs with exclusive access. For example, John places an elbow, a straight piece, and a union, then stops. Peter connects to the open port of the union, and then continues routing. The administrator should configure the permission groups as follows:

 Create two different permission groups: PG-John and PG-Peter. John should have full control access to PG-John while Peter should have read-only access to PG-John. Similarly, Peter should have full control access to PG-Peter while John should have read-only access to PG-Peter.

John should create the run using the **PG-John** permission group and route his part of the run. When Peter works on his part of the run, he should use **PG-Peter** as the active permission group. The Intermediate End Features will handle the connection between the two parts of the run.

Example Configuration C

In this example, two users, John and Peter, are working on different runs connected by branching components such as a tee. The administrator should configure the permission groups as follows:

Create two permission groups: PG-John and PG-Peter. John should have full control
access to PG-John while Peter should have read-only access to PG-John. Similarly, Peter
should have full control access to PG-Peter while John should have read-only access to
PG-Peter.

John creates an initial header run using **PG-John** as the active permission group and routes it as needed. Peter now wants to branch from John's run. Peter sets **PG-Peter** as the active permission group and selects the header in John's run from which to branch. Instead of creating the header component (such as a tee), the software generates a **To Do List** item for John.

When John updates the out-of-date **To Do List** item, the software modifies the header to add the tee, and then generates a **To Do List** item for Peter.

When Peter updates his out-of-date **To Do List** item, the software fixes the branch leg (the end of the branch leg is adjusted to the tee port). This is called a double hand-shaking mechanism.

SECTION 2

Piping Workflow

All piping elements are placed in the model using information defined in the piping reference data. Using the Catalog task or the reference data workbooks, you can create custom pipe specifications, edit pipe specification rules, and define pipe parts and symbols. Your first step should be to review, edit, and otherwise customize the delivered piping reference data. Refer to the *Piping Reference Data Guide* or the *Catalog Help* for more information.

After the reference data is customized to suit your needs, you need to define piping systems and pipelines in the Systems and Specifications task. You cannot place pipe runs in the model until the pipelines are defined.

After the piping reference data and the needed systems are defined, you can begin placing pipe in your model.

After pipe is in your model, the Piping task enables you to spool pipe into sections ready for manufacturing. To create penetration spools, at least one penetration plate must exist in the model. You can place penetration plates in the Hangers and Supports task.

See Also

Piping Common Tasks (on page 19)
Piping (on page 12)
Piping in the Integrated Environment (on page 21)

Piping Common Tasks

The following tasks are used frequently in the piping task.

Customize Reference Data

- Create custom pipe specifications.
- Define parts and symbols. For more information on creating symbols, see Smart 3D Symbols Reference Data Guide.

Create Needed Systems

- Create new pipe systems. For more information, see Create a piping system (on page 21).
- Create new pipelines. For more information, see Create a pipeline system (on page 20).

Route Pipe Runs

 Route new pipe runs in the pipelines that you defined. For more information, see Create a new pipe run (on page 66).

Insert Splits, Components, and Taps

Insert pipe splits in the pipe runs to create the needed spools lengths. You can insert splits
while routing the pipe runs or after the runs are in the model. For more information, see

- Place splits while routing pipes (on page 69), Insert a takedown joint (on page 127), and Insert a welded split (on page 127).
- Insert valves, reducers, tees, and other components. You can insert components while
 routing the pipe runs or after the runs are in the model. For more information, see *Place*components while routing pipes (on page 69) and *Insert a component* (on page 140).
- Insert ports on components for venting, drainage, and for the connection of other components such as instruments. For more information, see *Insert a tap* (on page 160).

Create Piping Spools

Split the pipe into spools by using the Generate Spools or Create Penetration Spools commands. For more information, see Create spools (on page 165) and Create penetration spools (on page 171).

Create a Pipeline System

In the Systems and Specifications task:

- 1. Click Task > Systems and Specifications.
- 2. In the tree, select the system in which you want to create the pipeline system.
- 3. From the ribbon, select New Pipeline System .
- 4. Type a description for the pipeline system.
- 5. Specify a fluid requirement and fluid type for the pipeline.
- 6. Click OK.
- 7. Select the new pipeline system in the tree, and then right-click and select **Properties**.
- 8. Change any properties of the system as needed.

In the Piping task:

- 1. Click **Select** on the vertical toolbar.
- 2. Select All in the Locate Filter.
- 3. In the **Workspace Explorer**, right-click on the parent to the pipeline system that you are creating.
- 4. Click **New System > New Pipeline** on the pop-up menu.
- 5. Type a description for the pipeline system.
- 6. Specify a fluid requirement and fluid type for the pipeline.
- 7. Click OK.
- 8. Right-click on the new pipeline system in the **Workspace Explorer**, and then select **Properties**.
- 9. Change any additional properties as needed.

Create a Piping System

In the Systems and Specifications task:

- 1. Click Task > Systems and Specifications.
- 2. In the tree, select the system in which you want to create the piping system.
- 3. From the ribbon, select New Piping System 🐯
- 4. Select the new system in the tree, and then right-click and select Properties.
- 5. Change any properties of the system as needed.

In the Piping task:

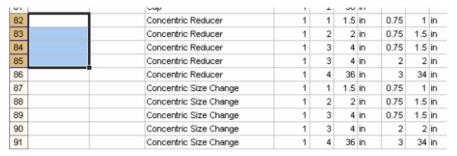
- 1. Click **Select** on the vertical toolbar.
- 2. Select All in the Locate Filter.
- 3. In the **Workspace Explorer**, right-click on the parent to the piping system that you are creating.
- 4. Click **New System > New Piping System** on the pop-up menu.
- 5. Right-click on the new piping system in the **Workspace Explorer**, and then select **Properties**.
- 6. Change any additional properties as needed.

Piping in the Integrated Environment

This section describes how to use the **Piping** task in a Smart 3D integrated environment. For more information, refer to the *Smart 3D Integration Reference Guide* available from the **Help > Printable Guides** command.

Piping Catalog Data

SmartPlant P&ID and Smart 3D must use the same naming convention for piping components for proper correlation in an integrated environment. This is because the software correlates based on the short code value published from SmartPlant P&ID to Smart 3D. An example of this would be to modify all pipe specification reducer components to reflect the name "Concentric Reducer" instead of the default name "Concentric Size Change". You can either edit the existing catalog spreadsheet entries or copy the existing entries and add new entries as shown below. After making necessary modifications, bulkload the spreadsheet into the Catalog.



Correlating Pipe Runs

You can correlate existing pipe runs by:

- 1. Select SmartPlant > Correlate with Design Basis.
- 2. Select the pipe run in the model.
- 3. Select the P&ID that contains the pipe run, and then click **Open**.
- 4. Select the pipe run in the P&ID.
- 5. Review any data mismatch between the P&ID pipe run and the model pipe run. Fix the data as appropriate.
- 6. Click Update.

Previously correlated pipe runs (displayed as green in the P&ID) that change color to red or magenta in the P&ID on subsequent retrieval of a new revision of the P&ID data, needs to be updated as follows:

- 1. Set the Locate Filter to Piping Runs.
- 2. Select the run in either the model or the P&ID.
- Select SmartPlant > Compare Design Basis.
 Any data item that has changed is highlighted in red.
- 4. Click Update.

■ NOTES

- When you click **Update**, the in-line component is also updated if it is still a valid piping component and if the component symbol still exists on the pipe run. If the symbol has been deleted, you will need to delete this component.
- The in-line components placed with the use of dimensional data from SmartPlant Instrumentation must be updated in a separate process.

Correlating Instruments

You can correlate existing instruments in the model by:

- 1. Select SmartPlant > Correlate with Design Basis.
- 2. Select the modeled instrument.
- 3. Select the P&ID that contains the instrument, and then click **Open**.
- 4. Select the instrument in the P&ID.
- 5. Review any data mismatches between the P&ID instrument and the modeled instrument. Fix the data as appropriate.
- 6. Click Update.

You can place new correlated instruments using existing Smart 3D Catalog instrument components or using the automatic creation of the instrument from the dimensional data supplied by SmartPlant Instrumentation.

To place standard Catalog instruments, you must manually match the instrument to place with the type of instrument called-out in the P&ID:

- Route the pipe run from the P&ID. For detailed steps, see Create a New Pipe Run from a P&ID Run (on page 67).
- 2. Select SmartPlant > View P&ID.
- 3. Select the P&ID that contains the instrument to place, and then click **Open**.
- 4. Click **Insert Component** and on the vertical toolbar.
- 5. Select the area of the pipe run to place the instrument.
- 6. Select the component in the P&ID view.
- 7. In the **Type** option on the ribbon, select **<Specify Component Tag>**.
- 8. Select Browse instruments.
- 9. Select the proper instrument as indicated on the P&ID.
- 10. Position the instrument, and click Finish.
- 11. Open the properties for the instrument and size it appropriately for the pipe run.

To place instruments built on the fly from the dimensional data sheet data published from SmartPlant Instrumentation, Smart 3D reads the dimensional data sheet, applies those values to the instrument in the background, and then places the instrument on the pipe feature.

When retrieving from a P&ID:

- 1. Route the pipe run from the P&ID. For detailed steps, see *Create a New Pipe Run from a P&ID Run* (on page 67).
- 2. Select SmartPlant > View P&ID.
- 3. Select the P&ID that contains the instrument to place, and then click **Open**.
- Click Insert Component a on the vertical toolbar.
- 5. Select the instrument in the P&ID.
- 6. Position the instrument on the pipe run, and then click **Finish**.

When retrieving directly from Dimensional Data Sheet information for instruments that do not exist on a P&ID:

- 1. Click **Insert Component** and on the vertical toolbar.
- 2. In the **Type** box on the ribbon, select **Specify Component Tag**.
- 3. Type in the component tag or browse the design basis.
- 4. If found, the software will create and correlate the component as it would if the component were selected from a P&ID.

Only those instruments that were built from dimensional data sheets or have had a name change require updating.

To update instruments built/placed from dimensional data sheets:

- 1. Retrieve the new DDP.
- 2. Select the instrument in the model.

- 3. Select SmartPlant > Compare Design Basis.
- 4. Any data item that has changed is highlighted in red.
- 5. Click Update.

In-line instruments placed from the catalog are automatically updated/re-validated when the parent pipe run is updated. To update instruments placed from the catalog:

- 1. Set the Locate Filter to Piping Features.
- 2. Select the instrument feature in the model.
- 3. Select SmartPlant > Compare Design Basis.
- 4. Any data item that has changed is highlighted in red.
- 5. Click Update.

Off-Page Connectors

Off-page connectors (OPC) connect multi-page P&ID drawings. Unlike other P&ID elements, the OPC is correlated when the two pipe runs are joined. The actual P&ID off-page connector symbol is never selected or used for correlation. The main issue to know when correlating piping with an OPC is that a weld is placed where the two pipe runs meet. Therefore, you should find a logical connection point for this weld in the model to avoid adding an additional unneeded weld. To correlate a pipe run that is located on multiple drawings, you should:

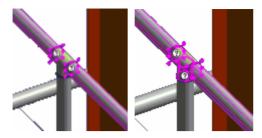
- 1. Route normally off the first, find a logical stopping point (such as an elbow).
- 2. Route normally from the second P&ID.
- 3. Then connect the two runs by extending or routing the necessary run to the other. A weld is placed between the two pipe segments (at the elbow or meeting point). This automatically correlates the OPC.

For more detailed steps, see Route pipe across P&ID off-page connectors (on page 68).

Topology Checker

The pipe run topology checker simply starts at one end of the pipeline and moves the end of the line. There are some rules that you should be aware to make sure the topology checker is running properly.

- Tees have the unique ability to belong to three different runs. For the purpose of topology comparison, any piping component can be considered to be in two runs.
- A pipe run must be continuous for the topology to be properly checked. This means that no component (tees included) can belong to a different run along that line. For example, if the third component along a pipe run was a tee that belonged to the branch run, the topology checker would not give proper results since the tee breaks the run. There are piping components that are still members of that first run, but the run is not continuous (left image: tee is not highlighted). After this tee is made a member of the original run, the topology checker will give proper results (right image: tee is highlighted).



An easy check to make sure you do not have this issue is to:

- 1. Set the locate filter to **Piping Runs**.
- 2. Select each run. If the complete run highlights everything is ok. If one or more components do not highlight, the topology checker is probably not returning true results.

To change a piping component to another run:

- 1. Set the locate filter to Piping Features.
- 2. Select the component.
- 3. Change the system to which that component is a member.

See Also

Create a new pipe run from a P&ID run (on page 67) Route pipe across P&ID off-page connectors (on page 68)

Jacketed Piping

This section describes the methods and procedures to model and extract jacketed piping systems. All aspects of jacketed piping can be accomplished using the current version of Smart 3D. There are currently no specific tools to model jacketed piping as one pipeline or to perform the routing of both internal and external piping in a single step. However, there are enough capabilities within the product and in the notation capabilities within the ISOGEN interface which makes it possible to create all the model graphics and necessary drawings to satisfy material requirements and to communicate fabrication and erection requirements through standard Smart 3D drawing output. This method, referred to hereafter as *Redundant Modeling*, requires that piping materials are placed in the Smart 3D model for both the external and internal portions of the jacket piping system.

Redundant Modeling

Redundant modeling is a method where internal piping (the core) is contained in one pipeline, and the external piping (the jacket) is overlaid on the internal piping in a separate jacket pipeline. This allows for the independent extraction of internal and external piping materials, using ISOGEN, without any problems with overlapping segments. For example, if piping area 01 has the requirement for jacket piping systems, then create an associated pipeline to contain the external piping. Redundant modeling is the best way to handle jacket piping systems when the contractor's scope includes detailed fabrication drawings, isometric drawings, material procurement, and precise configuration depiction.

See Also

Modeling Jacketed Piping (on page 26) Interference Checking (on page 36)

Isometric Extraction (on page 36)
Orthographic Drawing Production (on page 37)

Modeling Jacketed Piping

Modeling jacketed piping is a multi-step process.

Creating Jacketed Pipelines (on page 26)
Placing the Core Pipe and Components (on page 29)
Placing the Jacket Pipe and Components (on page 30)
Pipe Supports (on page 35)
Defining Isometric Remarks (on page 36)

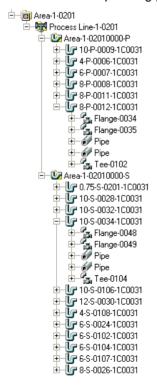
See Also

Modeling Jacketed Piping (on page 26) Jacketed Piping (on page 25)

Creating Jacketed Pipelines

This section provides recommendations for setting up jacketed pipelines. This is just an example to convey one method. Your specific contract standards and requirements may dictate a different method than what is recommended here.

For jacketed piping, it is recommend that you create a different piping system for each jacketed pipeline. In the below sample graphic, the jacketed piping system is located in Area-1-0201 and is named "Process Line-1-0201". Then under the piping system, create two pipelines for the core (named Area-1-02010000-P) and one pipeline for the jacket (named Area-1-02010000-S). The individual pipe runs and pipe parts will then appear under the corresponding pipelines for the core and jacket.



You need to create separate pipelines if for the core and jacket for several reasons:

- The core and jacket pipelines have different fluid requirements. This is a property on the pipeline object so two pipelines are needed for the two fluid requirements.
- Creates unique pipeline ID's for isometric drawings to prevent confusion between the core and jacket isometric drawings.

Creating the Jacketed Piping System

- 1. Switch to the **Systems and Specifications** task.
- 2. Select the parent system for the jacketed piping system. In our example, the parent system is Area-1-201.
- 3. Select **New Piping System** won the ribbon.
- 4. Edit the name of the jacketed piping system if needed.

Creating the Core Pipeline

- 1. Switch to the **Systems and Specifications** task if you are not already there.
- 2. Select the jacketed piping system in the tree view.
- 3. Select **New Pipeline System D** on the ribbon.
- 4. In the **New Pipeline** dialog box, specify the core description, sequence number, fluid requirement, and fluid type.

Creating the Jacket Pipeline

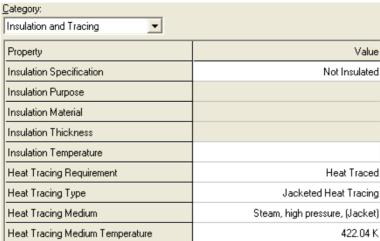
- 1. Switch to the **Systems and Specifications** task if you are not already there.
- 2. Select the jacketed piping system in the tree view.
- 3. Select **New Pipeline System 2** on the ribbon.
- 4. In the **New Pipeline** dialog box, specify the jacket description, sequence number, fluid requirement, and fluid type.

Creating Core Pipe Runs

In addition to selecting the piping specification, nominal diameter, and temperature and pressure settings, follow these steps when creating the core pipe runs using the **New Pipe Run** dialog box while in the Piping task.

- 1. In the **Standard** category:
 - a. Select the core pipeline in the **Pipeline** box.
- 2. In the Category option, select Insulation and Tracing.
 - a. In the Heat Tracing Requirement box, select Heat Traced.
 - b. In the **Heat Tracing Type** box, select **Jacketed Heat Tracing**.
 - c. In the **Heat Tracing Medium** box, select the medium in the jacket. This should match the fluid requirement and fluid type defined for the jacket pipeline.
 - d. In the **Heat Tracing Medium Temperature** box, specify the medium temperature.

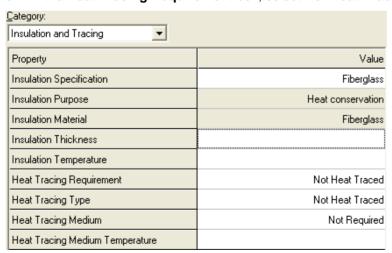




Creating Jacket Pipe Runs

In addition to selecting the piping specification, nominal diameter, and temperature and pressure settings, follow these steps when creating the jacket pipe runs using the **New Pipe Run** dialog box while in the Piping task.

- 1. In the **Standard** category:
 - a. Select the jacket pipeline in the **Pipeline** box.
- 2. In the Category option, select Insulation and Tracing.
 - a. Verify that **Insulation Specification** is set to your insulation of choice, such as **Fiberglass**.
 - b. In the **Insulation Thickness** and **Insulation Temperature** boxes, specify appropriate values.
 - c. In the Heat Tracing Requirement box, select Not Heat Traced.



See Also

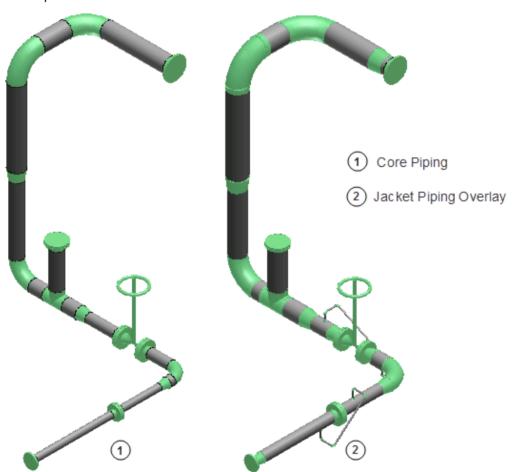
Modeling Jacketed Piping (on page 26)

Placing the Core Pipe and Components

You should model the core pipeline first and in such a way that the pipeline is contiguous, containing all in-line items, including: valves, flanges, instruments, connections to equipment, and so forth. Use the standard pipe routing procedures just as you would to route a non-jacketed pipeline. For more information about the routing pipe in general, see *Route Pipe* (on page 50).

We do recommend that you place reducers using the origin as the reference position. The origin reference position makes precision placement of the corresponding jacket reducer easier when you route the jacket.

To illustrate this concept, core verses jacket modeling, refer to the following graphic. A section of a jacket piping system's core piping is shown on the left. The jacket pipe overlaid on top of the internal piping is shown on the right. The configuration was designed to illustrate the most common details of a jacketed piping system. It is not inclusive of all situations nor is it intended to represent a realistic piping configuration. This was the best way to compact many details in a small space for illustration.



Placing all connections and in-line components with the internal core piping reduces the number of disconnected sections, produces better isometric drawings, and minimizes the external modeling requirements.

The valves that are used will probably be specific to the jacket piping specification and will have to be defined in the piping commodity specification like any other valve. Generally, this requires dimension tables specific to the valve being purchased, inclusive of the jacket. If a standard valve is being used and a bolt-on jacket is being applied, then the implied item feature of the piping commodity specification should be used to account for that jacket item. Consideration should be given to interference detection when the implied method is being used. Possibly provide a special dimension table based on a user defined geometric industry standard to allow for the spatial requirements of valve and jacket.

See Also

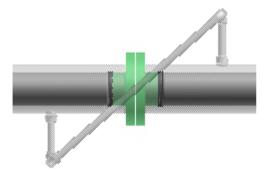
Modeling Jacketed Piping (on page 26)

Placing the Jacket Pipe and Components

The jacket pipe and components are placed in the jacket pipeline on top of the core pipeline using key locations of core pipe and components as placement aids. The placement of pipe and components in the jacket pipeline can be awkward because you are placing them sometimes at unnatural connect locations. The easiest method for modeling the jacket pipeline is to start at one end of core pipeline and work towards the other end. Be sure to use the **Tools > Point Along** and **Tools > PinPoint** commands to help with the exact placement of the jacket pipe and components.

★ IMPORTANT When routing the jacket pipes and components, be very careful not to select any of the core pipe or components as a route end point. If you do, you will create a branch between the core and the jacket pipe runs. This branch will be sent to the **To Do List** because the branch run (the jacket) will be larger than the header run (the core).

One way to model the jacket piping system is shown below (using a transparent view style). The jacket pipe is welded to the back of the core flange.

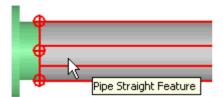


When placing jacket pipe to the back of a core flange, there are two placement methods you can use: **Point Along** or **Edge on solids**.

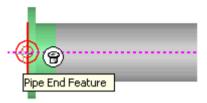
The **Tools > Point Along** placement method works best when starting routing at an end flange or possibly a nozzle.

- 1. Determine the flange thickness by setting the **Locate Filter** to **Piping Parts**, selecting the flange in question, and then reviewing the flange properties . Make a note of this thickness as you will need it in step 6.
- Click Tools > Point Along.

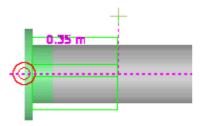
3. Select the core pipeline as the reference object.



4. Set the reference point to measure from at the end of the core pipe run (at the face of the flange).



- 5. Start the Route Pipe Fr command.
- 6. In the **Distance** box on the **Point Along** ribbon, specify the thickness of the flange from step 1.
- 7. Click to indicate that the Point Along distance is your starting point. Note that the beginning of the jacket pipe is aligned with the inside flange face.

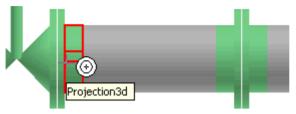


8. Route the jacket pipe as usual.

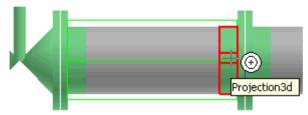
The **Edge on solids** SmartSketch3D method works well when routing between mated flanges or between mated flanges and an inline component such as a valve.

- 1. Click Tools > Options.
- 2. Select the SmartSketch3D tab.
- Verify that the Edge on solids option is selected, and then select OK.
- 4. Start the **Route Pipe ?** command.

5. Select the starting location of the jacketed pipe. Make sure that only the **Projection 3D** SmartSketch3D glyph appears when you click otherwise you may accidentally connect to the core piping.

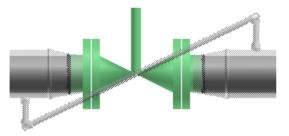


6. Select the ending location of the jacketed pipe. Again, make sure that only the **Projection 3D** glyph appears.

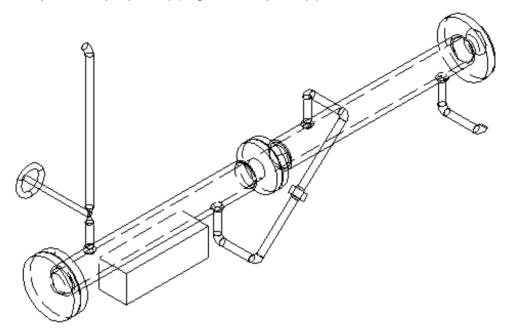


TIP You may want to use the **Tools > Add to SmartSketch List** to restrict the available SmartSketch3D relationships to just Projection 3D.

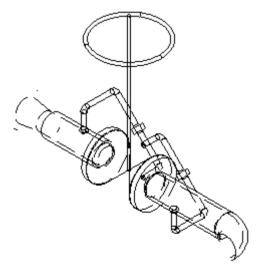
Another way to model jacket piping is to terminate the jacket prior to the flange or valve with a reducer as shown below. In either case, the details dictated by the jacket system should be followed.



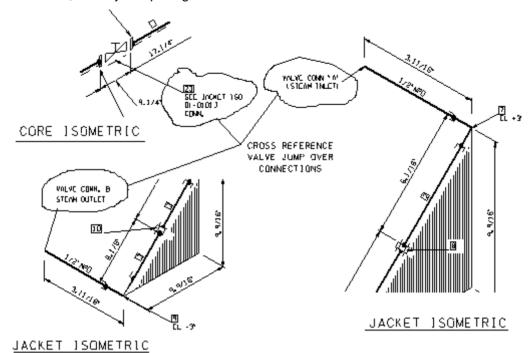
Jump over piping at core pipe flanges is placed in the jacket pipeline as branch points. The heating medium inlet to the jacket and a jump over at a flanged connection are shown below. The jacket and jump over piping are in the jacket pipeline.



Jump over connections at valves can be modeled by terminating the jump over connection in space at the required locations on the valve. As an alternative, you can use the **Place Tap** **command to tap the valve.



As shown in the below graphic, the remarks field of the terminator, cap or 'end' may be used to note the connection. Also, use the remarks field of the internal valve to refer to the jump-over connection, thereby completing the cross reference between the two isometrics.



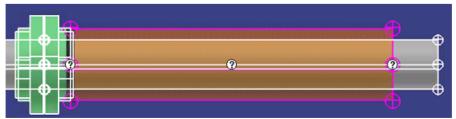
When you route a new pipe run from a third port of a jacket flange that is inserted on a core pipe run, the software by default considers the new pipe run as a jacket pipe run and creates a relationship between the core and jacket pipe run. This association is reported in isometric drawings to support the references between core and jacket pipe runs.

■ NOTE For the core pipe run, make sure that the Pipe Run Type property is set to Core Pipe Run.

Add/Remove Core Run Association

- 1. Select Piping Runs in the Locate Filter.
- 2. Select the jacket pipe run in the graphic view.
- 3. Click Select a Core Run to Add or Remove on the Edit Pipe Run ribbon.

If the core and jacket pipe runs are already associated, the associated core run is highlighted in white.

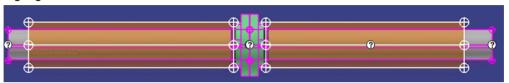


- Select the core pipe run to add or remove.
- 5. Click Finish.

Add/Remove Jacket Run Association

- 1. Select Piping Runs in the Locate Filter.
- 2. Select the core pipe run in the workspace.

If the core and jacket pipe runs are already associated, the associated jacket run(s) is highlighted in white.



- 3. Click Select a Jacket Run(s) to Add or Remove on Edit Pipe Run ribbon.
- 4. Select the jacket pipe run(s).
- 5. Click Finish.

See Also

Modeling Jacketed Piping (on page 26)

Pipe Supports

Pipe supports serve two purposes in a jacketed system:

- Locating spacer or restraint details between the internal and external piping.
- The normal support attachments for the jacket piping, for example: shoes, anchors, dummy legs, and so forth, are placed and extracted with external piping.

Normal Supports

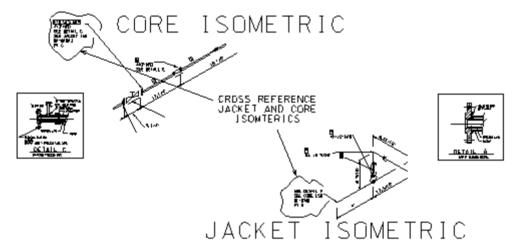
Use the Hangers and Supports task to place supports and hangers on the jacket pipeline just as you would a standard pipeline. Be careful when placing the supports that you only select the jacket pipeline. Otherwise the support will connect to the core pipeline and cause interference between the support and the jacket pipeline. For more information about placing hangers and support, see the Hangers and Supports Help or the *Hangers and Supports User's Guide* available from the **Help > Printable Guides** command.

See Also

Modeling Jacketed Piping (on page 26)

Defining Isometric Remarks

Use remarks to cross reference attachment points between the core and jacket piping on the isometric.



You can place remarks by setting the **Locate Filter** to **Piping Parts**, selecting the part that you want to remark, and then selecting **Insert > Note**. You can also use the **Notes** tab on the part's property dialog box.

In some cases you can use the component number to trigger a special detail on the isometric drawing. For example, if there is more than one way to close the end of a jacket pipe, the end component can carry a component number of CL-1, CL-2, CL-3, and so forth. This in turn can trigger the correct detail for the corresponding closure type to the isometric drawing.

See Also

Modeling Jacketed Piping (on page 26)

Interference Checking

The interference checking service may find many false clashes between the jacket and core.

See Also

Modeling Jacketed Piping (on page 26) Jacketed Piping (on page 25)

Isometric Extraction

We recommend that you use the same ISOGEN options for both internal and external extractions. This method reduces the risk of inconsistent isometric settings between the two extractions. If you make the line ID unique by adding a 'J' suffix to the line sequence number, then this will be enough to separate the two parts of the jacket system using the same line ID format. However, when the project dictates that the two lines, internal and external, are of different line ID formats, separate ISOGEN options files, identified by separate Intergraph default sets should be used.

See Also

Modeling Jacketed Piping (on page 26) Jacketed Piping (on page 25)

Orthographic Drawing Production

There are no special requirements for orthographic drawing with the exception of the vector hidden line settings. If it is required to show the internal pipe as dotted inside of the jacket pipe, then setting the 'Visible Only'/'Visible and Hidden' toggle to 'Visible and Hidden', and the 'Cleanup' option to 'On', will provide the appropriate results. You can define any special labeling requirements and can set up as normal to meet your requirements.

See Also

Modeling Jacketed Piping (on page 26) Jacketed Piping (on page 25)

Interface Workflow Example: CAESAR II and Smart 3D Integration

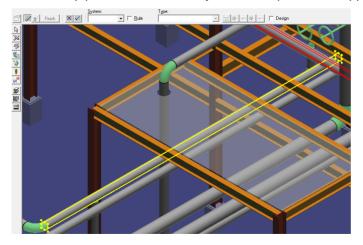
This workflow describes how to perform a piping stress analysis using the following applications:

- Smart 3D
- CAESAR II
- SmartPlant Review Publisher
- SmartPlant Review

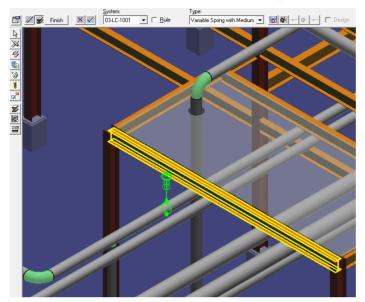
These Intergraph applications provide a complete solution that benefits all phases of the analysis process from design to quality assurance. The overall workflow is broken up into the processes listed below. Follow the steps in each process to see the complete Smart 3D > CAESAR II > SmartPlant Review workflow. The final process shows you how to go back to Smart 3D to reference additional graphics as Reference 3D data.

1. Modelling

- 1. Open your workspace in Smart 3D with a model to contain hangers and supports.
- 2. Click Task > Hangers and Supports.
- 3. Click Place Support by Structure on the vertical toolbar.
- 4. Select the pipe feature on which you want to place the support.

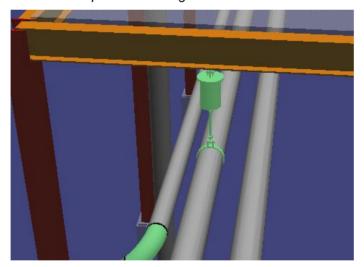


- Click Accept ✓.
- 6. Select the member on which to place the hanger, and then select the **Type**.



7. Click Finish.

The software places the hanger.



- 8. Click **Select** on the vertical toolbar, and then select **Piping Features** in the **Locate Filter**.
- 9. Select a piping component, and then click **Properties** on the ribbon bar.
- 10. Verify that the following properties are set on the piping components in Smart 3D before creating the ISO stress piping component files (PCFs):
 - COMPONENT-ATTRIBUTE1 Design pressure
 - COMPONENT-ATTRIBUTE2 Maximum temperature

- COMPONENT-ATTRIBUTE3 Material
- COMPONENT-ATTRIBUTE4 Wall thickness (reducing thickness in the case of reducing components)
- COMPONENT-ATTRIBUTE5 Insulation thickness
- COMPONENT-ATTRIBUTE6 Insulation density
- COMPONENT-ATTRIBUTE7 Corrosion allowance
- COMPONENT-ATTRIBUTE8—Component weight
- COMPONENT-ATTRIBUTE9 Fluid density
- COMPONENT-ATTRIBUTE10 Hydro test pressure

TIP Some of these properties can be set on the pipeline and some can be set on the piperun. Setting properties in Smart 3D before exporting to CAESAR II saves time because the Pipe Stress Analyst does not have to set them.

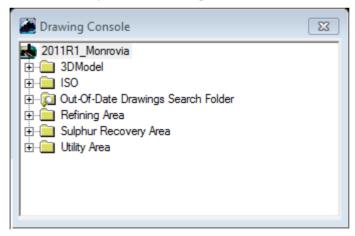
2. Exporting the Piping Stress Data for CAESAR II

Follow these steps to create the ISO stress package, and then save the PCFs from the ISO drawings so that the piping stress data can be imported by CAESAR II. For more information on working with isometric drawings, refer to the SmartSketch Drawing Editor online help provided with Smart 3D.

Create the ISO Stress Package:

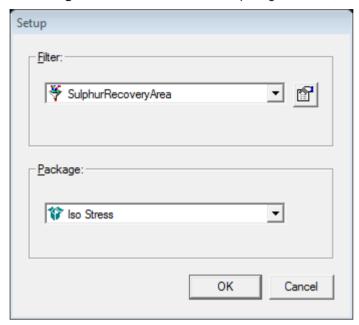
- 1. Click Task > Common.
- 2. Click Tools > Drawing Console.

The software opens the **Drawing Console** window.



- 3. Right-click the root node (the model name), and then select New.
- 4. On the Add Component dialog box, click Folder, and then click OK.
- 5. Select the newly-created folder and type in a name.
- 6. Right-click on the folder, and then select New.
- On the Add Component dialog box, click Drawings By Query Manager, and then click OK.

- 8. Rename the newly-created Drawings By Query Manager component.
 - TIP It is best to store the Drawings by Query Manager component in the same location as the other components with which it works.
- 9. Right-click on the new Drawings by Query Manager component, and select **Setup**. The software displays the **Setup** dialog box.
- 10. Set the **Filter** that contains the pipes that need to have their stresses analyzed, and then set the **Package** to **Iso Stress**. In the example figure below, **SulphurRecoveryArea** is the filter.

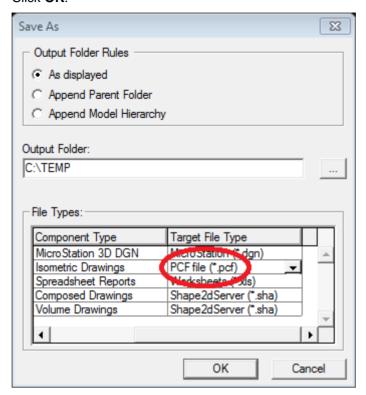


- 11. Click **OK**.
- 12. Right-click on the Drawings By Query Manager component, and then select Run Query.
- 13. After running the query, right-click Drawings By Query Manager component, and then select **Create Drawing(s)**.
- 14. To update the drawings so they can be opened and edited, expand and navigate through the **Console** tree view, and then select only the drawings to be updated.
- 15. Click **Update Now**.
 - TIP You can also right-click on the Drawings by Query Manager, and then select **Update Now**.

Saving the PCFs created from the ISO drawings:

- 1. Right-click on **Drawings By Query Manager > Save As.**
- 2. Select the Output Folder to contain the PCFs.
- 3. In File Types/Isometric Drawings, select *.pcf as the Target File Type.

4. Click OK.



3. Setting Up the Mapping Files

Before importing any PCFs into CAESAR II, set the mapping files so that the CAESAR II model matches your company standard and pipe stress analysis norms. Use any standard text editor to modify each required mapping file. The mapping files are described below.

PCF_MAT_MAP.TXT - Map the materials from Smart 3D to the CAESAR II **Material mapping file** material database.

PCF_RES_MAP.TXT - Map the supports in Smart 3D (based on your company standard) to support types definition in CAESAR II

PCF_SIF_MAP.TXT - Translate the components such as Tees to their corresponding category in the stress model with Stress Intensification Factors (SIFs)

PCF_UNITS_MAP.TXT Translate the units in the Smart 3D model to units for CAESAR II.

When editing the mapping files, make sure that the mapping files are in the CAESAR II system folder:

1. Start CAESAR II, and then click **Tools > Explore System Folder**.

2. Make sure each of the above mapping files are in the System folder location.

For detailed information about setting up mapping files for CAESAR II, see External Interfaces in the CAESAR II User's Guide or CAESAR II Help.

4. Creating a CAESAR II Project

- Create a folder for CAESAR II stress model files, and then copy the ISO PCFs into that folder.
- 2. From CAESAR II, click **File > Specify the default data directory for future work**, and then select the folder containing the ISO PCFs.
- 3. Click OK.
- 4. Click File > New.

The software displays the New Job Name Specification dialog box.

- 5. Define values for the Piping Input:
 - Type in the NEW job file name.
 - Select Piping Input.
- 6. On the New Job Name Specification dialog box, click OK.

The software displays the Review Current Units dialog box to show the display units.

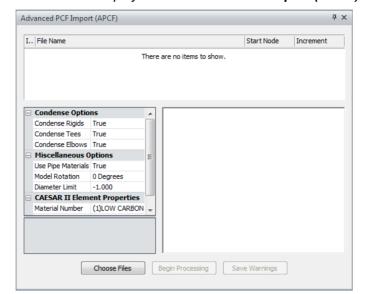
7. Click **OK** when you have finished.

■ NOTE CAESAR II can work with any set of units depending upon the user-defined project configuration setup.

CAESAR II opens the Classic Piping Input module for the new job.

5. Importing PCFs into CAESAR II

 In the CAESAR II Piping Analysis environment, click Environment > Advanced PCF Import (APCF).



The software displays the Advanced PCF Import (APCF) dialog box.

- 2. Click Choose Files, and then navigate to where the location of the ISO PCFs.
- 3. Select all the files, and then click Begin Processing.
 - **NOTE** You may need to repeat steps 2-3 multiple times depending on the amount of files and the amount of folders in the hierarchy to import all of the PCFs.

During the Conversion Process, status messages and warnings display in the message area on the **Advanced PCF Import (APCF)** dialog box.

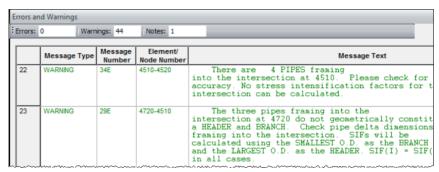
CAESAR II writes these messages to a LOG file with the name XXXX.LOG.RTF, where XXXX represents the name (less the extension) of the combined CAESAR II file. The log file is placed in the selected CAESAR II output file folder.

■ NOTE CAESAR II does not automatically close the dialog box if there are errors or warnings. Click **Save Warnings** to save warning messages to a text file you can reference later and close the **Advanced PCF Import (APCF)** dialog box.

When the final processing is finished, the software shows the pipes in the right-hand pane similar to the example graphic below.



- 4. Review the model to verify attributes such as materials, diameters, wall thicknesses, and operating conditions got transferred correctly.
- 5. Click Start Run is to check for errors.



NOTE You must resolve any errors for CAESAR II to run the analysis.

6. Click **Batch Run** to perform analysis with default load cases.

The software displays the **Static Output Processor**, which shows the results of the analysis.

6. Exporting to SmartPlant Review Publisher

When the stress analysis has been completed, you can share results back to design, structural, and support departments.

- In the CAESAR II main window, click Tools > External Interfaces > Data Export Wizard.
 The Data Export Wizard displays.
- 2. Click Next to continue.
- 3. On the **Input and Output Files** screen, define the following options:
 - Make sure that the correct CAESAR II job name is selected. The Export Wizard automatically populates this field with the name of the last viewed job.
 - Type in the Revision Number of the drawing.
 - Select Export Output Data Also.
 - Type in or browse and select the Data Export Output File location.
- 4. Click Next.
- 5. On the CAESAR II Input Export Options window, click Select AII, and then click Next.

The wizard processes the information. The amount of processing time depends upon the size of the model.

- 6. When the **Export Completed** message displays, click **OK**.
- 7. On the CAESAR II Output Report Options screen, click Select All for both the Static Load Cases and Output Options sections.
- Click Finish.
- 9. Click OK.

7. Publishing the CAESAR II Output File

Use SmartPlant Review Publisher to publish the CAESAR II output (MDB) file to a VUE file that can be opened by SmartPlant Review. Then, use the VUE file in SmartPlant Review Publisher to generate a ZVF file. The ZVF file can be opened by Smart 3D and used to attach additional graphics as reference 3D data.

Editing Translator.ini:

Before you use SmartPlant Review Publisher, update the Translator.ini file, located in the SmartPlant Review Publisher installation folder, to set the correct units for length (which can be found in the MDB file output from CAESAR II).

- 1. Open the MDB file, and then look at the INPUT_UNITS table under the LENGTH column.
- 2. Open the Translator.ini file and go to the Help section for Master Units. The numbers corresponding to units are listed.

```
; "Master Units" -- Possible values for this field are:
71
72
       METRIC VALUES UNITS DENOTED
73
     :
          59
                          meters
74
           61
                          millimeters
     :
75
           62
                          centimeters
    .
76
          63
                          kilometers
77
    .
          IMPERIAL VALUES UNITS DENOTED
78
          64
                           inches
79
     ;
           65
                           feet
80
           66
                         yards
81
                           miles
```

Go to the C2 Options section, and change the value to that which represents the unit of measurement in your CAESAR II file. The example below shows the units being set to inches.

4. Save your edits and close the Translator.ini file.

Using SmartPlant Review Publisher:

Open SmartPlant Review Publisher.

The SmartPlant Review Publisher main dialog box displays.

- 2. Click Publish now for the action.
- 3. Click Add, and then browse to the folder containing the exported CAESAR II MDB file.
- 4. Under Files of type, select CAESAR II Database Files (*.mdb).
- 5. Select the exported MDB file, and then click **Open**.
- 6. Click Publish.

The software generates DRV, MDB, MDB2 and VUE files and places them in the same

folder location as the MDB file. You can open the VUE file with SmartPlant Review. The example below shows the files generated from a CAESAR II MDB file named CII ANALYSIS.



. NOTE The generated MDB file is not the same file as the exported CAESAR II file.

Creating a ZVF File:

To be able to reference graphics as Reference 3D data in Smart 3D, you must generate a ZVF file from the VUE file using SmartPlant Review Publisher.

- 1. On the SmartPlant Review Publisher dialog box, click Publish Now.
- 2. Click **Add**, and then select the VUE file you just generated.

In the **Select Files** dialog box, select **SmartPlant Review VUE Files** as **ZVF Files** in the **Files of type** list.

- 3. Select the DRV and VUE files you just generated, and then click **Open**.
- 4. Click Publish.

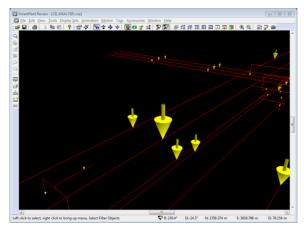
The software generates the ZVF file.

▶ NOTE The software retains the filename of the input file but replaces the file extension with ZVF. For example, if the input VUE file is named CII_ANALYSIS.vue, then the converted output graphics file is named CII_ANALYSIS.zvf.

8. Opening the Published VUE File in SmartPlant Review

You can now open the published VUE file to see the graphics of the pipe centerlines and support loads from CAESAR II.

- 1. Open SmartPlant Review.
- 2. Click **File > Open**, and then select the VUE file you published using SmartPlant Review Publisher.

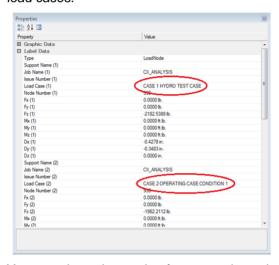


In the above example graphic, the pipe centerline from a stress model is shown along with cones indicating the position of the supports. The direction of the cone does not represent the type or direction of the actual support.

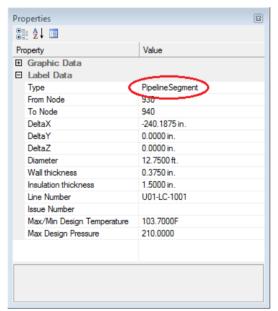
Select a load cone feature in the main view, and then click View > Properties.

Select a load cone, and then right-click to select **Properties**.

The Properties dialog box displays. Using the Properties command, you can see the properties for load cones and for pipeline segments. This data is the result of the pipe stress analysis from CAESAR II. The example figure below shows load cone properties and the load cases.



You can also select a pipe feature and see the centerline properties as shown in the example figure below.



9. Referencing Graphics as Reference 3D Data

You can open the ZVF file published in Smart 3D, and use the Reference 3D Model feature in Project Management to superimpose the example ISO drawings of the load cones on top of the pipelines and supports.

■ NOTES

- Before you begin this process, make sure the Generic Schema (GenericSchema.xls) and Generic Mapping (GenericToR3DMapping.xls) files exist in the plant symbol share folder at [Product Folder]\3DRefData\SharedContent\Data\Reference3DComponents, or in the folder where the ZVF and DRV files are located. Placing the mapping files in the same folder as the ZVF and DRV files allows you to attach multiple Generic R3D models, each with their own schema.
- If you have load case numbers greater than 20, you must use the GenerateMappingTool utility located in [*Product Folder*]\Core\Tools\Administrator\Bin folder to generate the mapping and schema files. The current mapping and schema files that are provided support load cases numbered 1-20. Follow the steps to use the GenerateMappingTool utility at the end of this section.
- 1. Open Smart 3D **Project Management** for the site containing the model.
- 2. Right-click on the Plant node, and select New Reference 3D Model.
- 3. In the **New Reference 3D Model** dialog box, fill in the following information:
 - Model Name
 - Model Type Select Generic for this example workflow.
 - Interference Detection Select No.
 - File Path Select the path to the folder containing the published ZVF and DRV files.
- 4. Click OK.
- 5. In Smart 3D, click File > Define Workspace.
- 6. Select the model in which you want to work.
- 7. Select the filter you used in creating the load cone ISO drawings.
- 8. Click the **Reference 3D** tab on the **Filter Properties** dialog box, and then select the Reference 3D model you created in steps 2-3 above.
- 9. Click **OK** to change the filter properties.
- 10. Click **OK** to define the workspace.

The software displays the load cones with the supports.

For Load Case Numbers Greater than 20

Follow the steps below to use the GenerateMappingTool utility to generate mapping and schema files to support load numbers greater than 20. With these newly-generated files, you can then add the ZVF file as Reference 3D data.

- 1. Go to [*Product Folder*]\Core\Tools\Administrator\Bin and start the GenerateMappingTool.exe to open the **GenerateMappingTool** dialog box.
- 2. Use Type for the Class Identifying Label.

- 3. Specify or click **Browse** to browse for the input folder that contains the DRV files.
 - TIP We recommend that you make sure the DRV files are in a folder that does not contain other DRV files.
- 4. Specify or click **Browse** to browse for the output folder, where the utility generates and saves the mapping and schema files.
- 5. Click Generate.

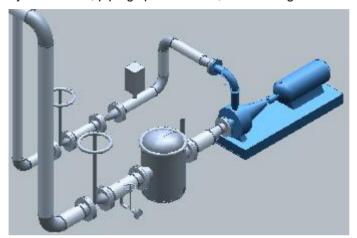
The status bar of the tool shows the state of the generating process.

- 6. After the utility generates the files, click **Open Map** to display the mapping file.
- 7. Edit the mapping file to provide additional information for mapping such as target class, source interface, target interface, and target property.
- 8. Click **Open Schema** to display and review the schema file.
- 9. Now you are ready to use the Reference 3D feature in Project Management as described in steps 1-10 in the above workflow.

SECTION 3

Route Pipe

Creates, models, and extends pipe runs quickly and precisely. Pipe runs may be straight or circular, and, in general, behave the same way. All pipe run features and components are driven by constraints, piping specifications, and catalogs.



By default, the software uses fast mode to dynamically display a pipe run as you define the route. When in fast mode, the software does not render elbows or turns during the dynamic display; instead, the software displays the elbows and turns after you define the pipe run location. You cannot route a non-radial branch while in fast mode. Press SHIFT+F to turn off fast mode.

The **Route Pipe** command also works with the **Insert Split** and **Insert Component** commands to add features while routing. After placing the feature, such as a gate valve, the route command automatically restarts from the open port of the inserted feature. **Route Pipe** also uses the concept of routing on a plane to enable the quick, precise creation of pipe runs.

The **Route Pipe** command supports the following:

- Routing using an existing pipe run
- Routing using a newly created pipe run
- Routing using a pipe run defined in the P&ID design basis (if P&ID design basis data is available)
- Routing to and from an end feature
- Routing to and from an equipment nozzle
- Routing to and from a straight feature (creating a branch)
- Inserting a component while routing
- Inserting a split while routing

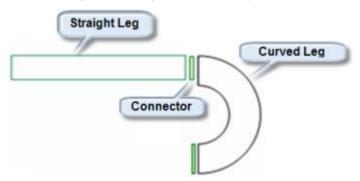
When routing any pipe run, the major steps include selecting a starting point, defining the characteristics of the run (nominal pipe diameter, piping specification, options), routing the run

point-by-point, and selecting the end point of the run. To route an arc pipe run, you include a center point, as well.

Routing a Circular or Arc Pipe

You use the **Route Pipe** command ribbon to model arc pipes, such as might be needed in gas turbines or in the nuclear industry for carrying fluids. You can place a circular ring or route out of bends using branch fittings, components or stub-ins.

When the curve leg and normal leg connect, **Route Pipe** places a new zero-angle turn called a connector. The curve leg can hold all the route pipe features except straight-leg and end-leg. If the curve-leg is a full ring, then it can only have curve and along-leg features on the leg.



A curve leg with a single curve feature may be placed, but it is not logged in the **To-Do** list. You will need to manually insert the split point.

Routing To or From a Straight Feature, End Feature, or Nozzle

In addition to the basic functions of creating new runs or extending previous runs, the **Route Pipe** command supports routing to or from straight features, end features, and nozzles.

When routing a pipe run, you can define the run starting point either before or after clicking the **Route Pipe** command. In either case, if a feature was selected, the command determines the default working plane based on that feature. Additionally, the command determines whether to continue the pipe run associated with that feature or to create a new run. The software automatically generates any parts required for the connection, including branch components. This functionality allows you to easily extend or branch out of a previously modeled pipe run.

Preventing Skewed, Non-Square, and Non-Plumb Piping

Occasionally, you might accidentally model piping that is slightly askew, out of plumb, or not square and not notice the error. If you continue routing, it results in the propagation of the original error to other runs. To help you avoid this problem, the software performs these checks:

Major Axis Check

The software checks if newly created legs or modified legs are slightly off alignment of a major coordinate system axis. For non-sloped pipes, the software displays a message if the leg is between 0.05° and 3.00° off the major axis. For sloped pipes, the range is 1.50° and 4.50°. Both ranges can be customized by editing the registry in your computer. Contact Intergraph support for more information, http://support.intergraph.com.

Square Check

When you model a leg that connects to an existing leg, the software checks the angle between the two legs and displays a message when the angle is between 87.00° and 89.95°, or between 90.05° and 93.00° for non-sloped pipes. For sloped pipes, the ranges are 85.50° and 88.50°, and 91.50° and 94.50°. You can customize these ranges also by editing the registry in your computer.

Small Turn Feature Check

The software anticipates that angles equal to or less than the specified values are a result of a "fit-up" and, as such, do not need a turn feature. The registry entries,

SupressTurnFeatureMinimumAngle and SupressTurnFeatureMinimumAngleSloped control the turn feature placement, and are stored in

HKEY LOCAL MACHINE\Software\Intergraph\SP3D

\CommonRoute\AnglePreferences. You can customize these values. Any changes made to the registry are at your own risk.

- ★ IMPORTANT Be aware that even though a turn feature is not modeled, the angle between the legs is not modified and remains as you modeled it.
- SupressTurnFeatureMinimumAngle Does not place a turn feature if the pipe angle is equal to or less than the specified value. The default value is 0.5°.
- SupressTurnFeatureMinimumAngleSloped Does not place a turn feature if the sloped pipe angle is equal to or less than specified value. The default value is 0.25°.

Route Pipe Ribbon

Sets options for routing a pipe.

Straight Pipe

Properties

Displays the **Route Pipe Settings** dialog box. For more information, see *New Pipe Run Dialog Box* (on page 85).

Straight Routing

Click to model a straight pipe.

Arc Routing

Click to model an arc pipe.

T Start Route

Click to specify the starting location for the pipe run. The starting point can be an equipment nozzle, an open port of a feature such as a tee or valve, the end feature of another pipe run, or a point in space.

End Route

Click to specify the end point of the current pipe run. The end point can be an equipment nozzle, an open port of a feature such as a tee or valve, the end feature of another pipe run, or a point in space. If the end point is a point in space, then that point serves as the starting point for the next leg of the pipe run.

Plane

Activates options for selecting a working plane for the route path. Six options are available:

- Plan Plane Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- Elevation Plane: East-West Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
- Elevation Plane: North-South Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- Plane by Turn/Branch Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
- Plane by Three Points Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
- No Plane Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays existing pipe runs along with the <New Pipe Run>, <New/Continue Run>, <Select from P&ID>, <Select Graphically>, and More options. Select the pipe run to route or select <New Pipe Run> to create a new pipe run to route. If a new pipe run is created, all runs associated with the parent pipeline selected on the New Pipe Run dialog box appear in the list.

Select **<New/Continue Pipe Run>** to automatically extend an existing pipe run by selecting the end feature of that pipe run. If a run is continued, all runs associated with the pipeline parent of the continued run appear in the list. If you do not select an end feature, the **New Pipe Run** dialog box automatically activates to create a pipe run. For more information, see *New Pipe Run Dialog Box* (on page 85).

Select **<Select from P&ID>** to graphically select a run in a P&ID to route. When you select the run in the P&ID, the software checks if the run already exists in the Smart 3D model. If the run does exist, the current run is set to that run. If the run does not exist, the **New Pipe Run** dialog box displays using values from the run that you selected in the P&ID as the defaults. When you click **OK**, the run is created, and then correlated to the run in the P&ID.

Select **<Select Graphically>** to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View.

Select **More** to select a pipe run that is associated with a different pipeline parent. For more information, see *Select Pipe Run Dialog Box* (on page 98).

b Lock Angle

Locks or unlocks the **Angle** box.

Angle

Type or select an angle for the current route segment. You can type any value needed, provided it does not conflict with the defined specifications. If the **Angle Lock** is unlocked, this box displays a dynamic readout of the current bend angle. If you have **No Plane** selected, you can only lock the angle to 0 and 90 degrees.

Turn Option

Select the option code associated with the turn component that you want to use while routing. Only those option codes defined in the controlling piping specification and shared by all of the short codes that can be placed automatically while routing appear. Only the options available for all short codes available during routing are listed. If pipe spec writer only added a second choice for 90 degree direction change, then route would not display it in the drop down list.

😘 Lock Length

Locks or unlocks the Length box.

Length

If **Lock Length** is locked, type or select a length for the current route segment. If **Lock Length** is unlocked, this box displays the length of the current pipe run being placed.

Straight Option

Select the option code associated with the pipe that you want to use while routing. Only those option codes defined in the controlling piping specification appear.

Offset

Controls the SmartSketch offset constraint. Type the distance that you want to offset the pipe that you are routing. Select **<Disabled>** if you do not want to use the offset constraint to help route the pipe. Select **Set Offset Reference** to define the reference point. For more information on setting the reference point, see *Set Offset Reference Dialog Box* (on page 95).

1 Lock Slope

Locks or unlocks the Slope box.

Slope

Displays the defined minimum slope for the run. This option is only enabled when you defined a slope on the **New Pipe Run** dialog box. If a value greater than or equal to the minimum slope of the run is typed, it is applied only to the leg currently being routed. After the leg is modeled, the value of the **Slope** box reverts to the minimum slope defined for the pipe run. You cannot type a slope value that is less than the minimum slope specified for the pipe run except for 0 to route a horizontal leg in the pipe run. Select **Use Default Slope** to automatically change the slope value to match the **Minimum Slope** property of the pipe run. You can change the units of measure for the slope using **Tools > Options > Units of Measure**.

Circular or Arc Pipe

Properties

Displays the **Route Pipe Settings** dialog box. For more information, see *New Pipe Run Dialog Box* (on page 85).

Straight Routing

Click to model a straight pipe.

Arc Routing

Click to model an arc pipe.

- Arc Start Point

Click to specify the starting location for the arc pipe run. The starting point can be an equipment nozzle, an open port of a feature such as a tee or valve, the end feature of another pipe run, or a point in space.

Arc Center Point

Click to specify the center point for the arc pipe run.

Arc End Point

Click to specify the end point for the arc pipe run. The end point can be an equipment nozzle, an open port of a feature such as a tee or valve, the end feature of another pipe run, or a point in space. If the end point is a point in space, then that point serves as the starting point for the next leg of the pipe run.

Finish

Click to indicate that the points are set and the arc may be routed.

Plane

Activates options for selecting a working plane for the route path.

- Plan Plane Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- Elevation Plane: East-West Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
- Elevation Plane: North-South Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- Plane by Turn/Branch Defines the work surface as the plane defined by an
 existing turn or branch. You select the turn or branch to set the plane. You also can
 press CTRL+4 to select this option.
- Plane by Three Points Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
- No Plane Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays existing pipe runs along with the <New Pipe Run>, <New/Continue Run>, <Select from P&ID>, <Select Graphically>, and More options. Select the pipe run to route or select <New Pipe Run> to create a new pipe run to route. If a new pipe run is created, all runs associated with the parent pipeline selected on the New Pipe Run dialog box appear in the list.

Select **<New/Continue Pipe Run>** to automatically extend an existing pipe run by selecting the end feature of that pipe run. If a run is continued, all runs associated with the pipeline parent of the continued run appear in the list. If you do not select an end feature, the **New Pipe Run** dialog box automatically activates to create a pipe run. For more information, see *New Pipe Run Dialog Box* (on page 85).

Select **<Select from P&ID>** to graphically select a run in a P&ID to route. When you select the run in the P&ID, the software checks if the run already exists in the Smart 3D model. If the run does exist, the current run is set to that run. If the run does not exist, the **New Pipe**

Run dialog box displays using values from the run that you selected in the P&ID as the defaults. When you click **OK**, the run is created, and then correlated to the run in the P&ID.

Select **<Select Graphically>** to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View.

Select **More** to select a pipe run that is associated with a different pipeline parent. For more information, see *Select Pipe Run Dialog Box* (on page 98).

1 Lock Arc radius

Locks or unlocks the Arc radius box.

Arc radius

Type or select the radius of the arc pipe. Select **Maintain Same Radius** to route an arc pipe from the existing arc maintaining the same radius. This option appears only when you route from an existing arc.

1 Lock Arc Angle

Locks or unlocks the Arc angle box.

Arc Angle

Type or select an angle for the arc segment. You can type any value needed, provided it does not conflict with the defined specifications. If the **Arc Angle Lock** is unlocked, this box displays a dynamic readout of the current arc angle. If you have **No Plane** selected, you can only lock the angle to 0 and 90 degrees.

Lock Arc Length

Locks or unlocks the Arc length box.

Arc Lenath

If **Lock Arc Length** is locked, type or select a length for the current route segment. If **Lock Arc Length** is unlocked, this box displays the length of the current pipe run being placed.

Straight option

Select the option code associated with the pipe that you want to use while routing. Only those option codes defined in the controlling piping specification appear.

Modify Pipe Run Ribbon

Properties

Displays the **Pipe Run Properties** dialog box. For more information, see *Pipe Run Properties Dialog Box* (on page 287).

Run

Displays the name of the pipe run. You can select an existing run in a graphic view or the Workspace Explorer.

Pipeline

Displays the pipeline system to which the pipe run belongs. Select **More** to associate the pipe run to another pipeline system.

Minimum Slope

Displays the minimum slope for the pipe run. You must specify a minimum slope value for a sloped pipe run.

🏂 Select a core run to Add or Remove / Select Jacket Run(s) to Add or Remove

Modifies core and jacketed pipe run relationship. You can select either core pipe run or the jacketed pipe run to modify the relationship. The tooltip varies based on the type of pipe run you first select.

Finish

Select to establish the core and jacketed pipe relationship.

Modify Pipe Straight Feature Ribbon

Displays options for editing a straight feature.



Displays the Pipe Straight Feature Properties dialog box. For more information, see Pipe Straight Feature Properties Dialog Box (on page 294).

Move From

Click to specify the starting location of the move vector. If you do not define a starting point, the software assumes that the current location of the object is the starting point.

Move To

Click to specify the ending location of the move vector.

Plane

Activates options for selecting a working plane for the route path. Six options are available:

- Plan Plane Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- Elevation Plane: East-West Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
- Elevation Plane: North-South Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- Plane by Turn/Branch Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
- Plane by Three Points Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
- No Plane Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays the name of the pipe run with which the selected feature is associated. All other pipe runs associated with the same pipeline parent also appear in the list. Another pipe run can be selected if needed. Select < Select Graphically> to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View. Select More to select a pipe run

associated with a different pipeline.

Type

Displays the short code associated with the selected pipe. The **Type** list also contains the short codes associated with any other pipes defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected pipe with one of a different type.

Option

Displays the option of the selected pipe. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. For example, if two different wall thickness values are available in the piping specification for the short code selected in the **Type** box, both options appear in this list. Selecting another entry from the **Option** list updates the object accordingly.

A Lock Length

Defines whether or not the length of the selected pipe should remain constant while moving.

When locked , the software automatically modifies the turn points, along with the length and angle of adjacent straight features, to remain connected to the moved leg. The length of the moved leg does not change.

When not locked $\stackrel{\triangle}{=}$, the software extends or shortens the associated legs to connect with the new position of the moved pipe. The length of the moved leg can change. Any component, such as a valve, on the moved pipe maintains its relative position from the pipe ends.

Offset

Controls the SmartSketch offset constraint. Type the distance that you want to offset the pipe that you are editing. Select **<Disabled>** if you do not want to use the offset constraint. Select **Set Offset Reference** to define the reference point. For more information on setting the reference point, see *Set Offset Reference Dialog Box* (on page 95).

Slope

Displays the slope of the selected straight feature. This option displays only for sloped pipe runs.

Modify Pipe End Feature Ribbon

Displays options for editing an end component, such as a cap, blind flange, or a pipe end.

Properties

Displays the **Pipe End Feature Properties** dialog box. For more information, see *Pipe End Feature Properties Dialog Box* (on page 283).

Move From

Click to specify the starting location of the move vector. If you do not define a starting point, the software assumes that the current location of the object is the starting point.

Move To

Click to specify the ending location of the move vector.

NOTE When you move or modify a route object in HVAC, Electrical, or Piping, Smart 3D treats any unfinished ends as free end features. An unfinished end is an end with mating

parts or a logical data connection with one logical port. You can reconnect using these free end features. This behavior allows you to reuse existing mating parts and connections and reduces wait times.

Plane

Activates options for selecting a working plane for the route path. Six options are available:

- Plan Plane Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- Elevation Plane: East-West Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
- **Elevation Plane: North-South** Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- Plane by Turn/Branch Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
- Plane by Three Points Defines the work surface using three points that you define.
 You also can press CTRL+5 to select this option.
- No Plane Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays the name of the pipe run with which the selected end feature is associated.

Type

Displays the short code associated with the selected end. The **Type** list also contains the short codes associated with any other end components defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected end component with one of a different type.

Option

Displays the option of the selected end. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. Selecting another entry from the **Option** list updates the object accordingly.

1 Lock Angle

Locks or unlocks the **Angle** box.

Angle

Displays the angle of any turn or branch component that is located at the other end of the leg with which the selected end feature is associated. If no turn or branch exists at the other end of the leg, then this box is disabled. Changing the angle value adjusts the position of the selected end feature to achieve the specified angle and then locks that angle value. When this box is unlocked, the value updates dynamically as the selected end component is moved.

😘 Lock Length

Locks or unlocks the Length box.

Length

Displays the length of the run leg connected to the end being edited. Typing a value in this box adjusts the position of the selected end feature to achieve the specified length and then locks that length value. When this box is unlocked, the value updates dynamically as the selected end component is moved.

Offset

Controls the SmartSketch® offset constraint. Type the distance that you want to offset the pipe that you are routing. Select **<Disabled>** if you do not want to use the offset constraint to help route the pipe. Select **Set Offset Reference** to define the reference point. For more information on setting the reference point, see *Set Offset Reference Dialog Box* (on page 95).

5 Lock Slope

Locks or unlocks the **Slope** box. This option displays only for sloped pipe runs.

Slope

Displays the defined minimum slope for the end feature. Select **Use Default Slope** to automatically change the slope value to match the **Minimum Slope** property of the pipe run. You can change the units of measure for the slope using **Tools > Options > Units of Measure**. This option displays only for sloped pipe runs.

Modify Branch Feature Ribbon

Displays options for branches placed in the model.

Properties

Activates the properties dialog box for the selected branch. For more information, see *Pipe Component Feature Properties Dialog Box* (on page 148).

Move From

Click to identify the origin of the move vector. If you do not define a starting point, the software assumes that the current location of the branch is the starting point.

Move To

Click to identify the termination point of the move vector.

Type

Displays the short code associated with the selected branch. The **Type** list also contains the short codes associated with any other branches defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected branch with one of a different type.

Option

Displays the option of the selected branch. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. Selecting another entry from the **Option** list updates the object accordingly.

Run

Displays the name of the pipe run to which the branch is associated. All other pipe runs associated with the same pipeline parent also appear in the list. Another pipe run can be

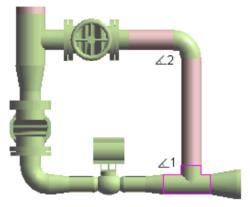
selected if needed. Select **<New Pipe Run>** to create a new pipe run to route. Select **<Select Graphically>** to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View. Select **More** to select a pipe run associated with a different pipeline.

Angle 1

Specifies the angle of the branch.

Angle 2

Specifies the angle of the turn or branch feature located at the other end of the branch leg. If this box is blank, there is no turn or branch feature located at the end of the branch leg.



₩ Flip

Orients the branch so that the selected port is located at the insertion point. If a lateral, tee, or other tee-type branch is located along the length of a pipe or between two components, only the in-line ports of the component are available when flipping. However, if the same component is located at the end of a pipe run, all component ports are available.

Rotate

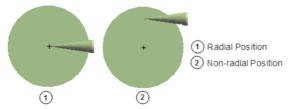
Select to rotate the branch about the pipe interactively. This option is available only when nothing has been connected to the branch port.

Angle

Type an angle at which you want the branch rotated about the pipe. This option is available only when nothing has been connected to the branch port.

Branch Position

Select the position of the branch centerline relative to the header centerline. Select **Radial** to place the branch such that its centerline intersects the header centerline. Select **Non-Radial** to place the branch such that its center line does not intersect the header centerline. If you select **Non-Radial**, you can specify the distance the branch centerline is offset from the header centerline up to being tangent to the outside diameter of the header.



Modify Turn Feature Ribbon

Displays options for turns or bends placed in the model.

Properties

Activates the properties dialog box for the selected turn. For more information, see *Pipe Turn Feature Properties Dialog Box* (on page 302).

Move From

Click to identify the origin of the move vector. If you do not define a starting point, the software assumes that the current location of the turn is the starting point.

Move To

Click to identify the termination point of the move vector.

Plane

Activates options for selecting a working plane for the turn. Six options are available:

- Plan Plane Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- Elevation Plane: East-West Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
- Elevation Plane: North-South Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- Plane by Turn/Branch Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
- Plane by Three Points Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
- No Plane Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays the name of the pipe run with which the selected turn is associated. All other pipe runs associated with the same pipeline parent also appear in the list. Another pipe run can be selected if needed. Select **<New Pipe Run>** to create a new pipe run to route. Select **<Select Graphically>** to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View. Select **More** to select a pipe run associated with a different pipeline.

Type

Displays the short code associated with the selected turn. The **Type** list also contains the short codes associated with any other turns defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected turn with one of a different type.

Option

Displays the option of the selected turn. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. For example, if two different wall thickness values are available in the piping specification for the short code selected in the **Type** box, both options appear in this list. Selecting another entry from the

Option list updates the object accordingly.

₩ Flip

Orients the turn so that the other turn port is connected to the end of the run. This option is available only when a turn is connected to the end of a run and no other part has been connected to the other turn port.



🔓 Lock Angle

Locks or unlocks the Angle 2 and Angle 3 boxes. Locking the corresponding angle value creates a constraint along which the selected turn angle can be moved.

Angle 2

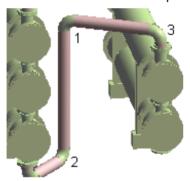
Specifies the angle of the turn feature located at the end of one associated leg. If this box is blank, there is no turn feature located at the end of the leg. When you select this box, the software highlights the Angle 2 turn feature in the model. Although this value can be changed, the location of the corresponding turn cannot. Modification of this value repositions the selected turn until the specified angle is achieved.

Angle 1

Specifies the angle of the turn that you are editing. Modification of this value repositions the selected turn until the specified angle is achieved.

Angle 3

Specifies the angle of the turn feature located at the end of one associated leg. If this box is blank, there is no turn feature located at the end of the leg. When you select this box, the software highlights the Angle 2 turn feature in the model. Although this value can be changed, the location of the corresponding turn cannot. Modification of this value repositions the selected turn until the specified angle is achieved.



Locations of Angles 1, 2, & 3

Offset

Controls the SmartSketch offset constraint. Type the distance that you want to offset the pipe that you are routing. Select <Disabled> if you do not want to use the offset constraint to help route the pipe. Select Set Offset Reference to define the reference point. For more information on setting the reference point, see Set Offset Reference Dialog Box (on page 95).

Modify Slope

Activates the **Modify Slope** dialog box, with which you can modify the slope of the legs on

either side of the selected turn. For more information, see *Modify Slope Dialog Box* (on page 98).

Modify Pipe Part Ribbon

Displays options for editing the selected object. This ribbon displays when you set the **Locate Filter** to **Piping Parts**, and select a part in the model.



Displays the properties dialog box for the selected object.

Run

Displays the name of the pipe run with which the selected object is associated. You cannot change the run.

Type

Displays the short code associated with the selected object. The **Type** list also contains the short codes associated with any other objects defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected object with one of a different type.

NOTE This option is read-only for generic piping component.

Option

Displays the option of the selected object. The **Option** list also contains any options defined in the piping specification for the short code selected in the **Type** box. For example, if two different wall thickness values are available in the piping specification for the short code selected in the **Type** box, both options appear in this list. Selecting another entry from the **Option** list updates the object accordingly.

NOTE This option is read-only for generic piping component.

Name

Specifies the object name. You can type a new name if needed.

NOTE This option is read-only for generic piping component.

Tag

Specifies the engineering tag for the object.

NOTE This option is read-only for generic piping component.

Base/Mating Part

Displays whether the selected object is a base part or a mating part. If the object is a mating part, you can use this option to change the object to a base part. Use caution however, because after a mating part has been changed to a base part, it cannot be changed back to a mating part again.

NOTE This option is read-only for generic piping component.

Modify Surface Mount Pipe Component Ribbon

Displays options for surface mount pipe components placed in the model.



Opens a dialog box with properties for the selected surface mount pipe component. Allows you to review the properties of the selected component and change the value assigned to a property.

Move From

Defines the origin of the move vector. If you do not define a starting point, the current location of the end feature is assumed to be the starting point.

Move To

Defines the termination point of the move vector.

Run

Specifies the name of the pipe run on which the component is placed.

Type

Displays the tag associated with the selected component. In addition, the **Type** list contains the tags associated with other surface mount components. Selecting an entry from the **Type** list replaces the selected component with one of a different tag.

Rotate

Rotates the surface-mounted component about the pipe interactively around the feature axis.

Angle

Defines the angle for rotating the component around the pipe.

What do you want to do?

- Create a new pipe run (on page 66)
- Create an arc pipe run (on page 67)
- Create a new pipe run from a P&ID run (on page 67)
- Route pipe across P&ID off-page connectors (on page 68)
- Place components while routing pipes (on page 69)
- Place splits while routing pipes (on page 69)
- Route a sloped pipe run (on page 70)
- Route a multi-sloped pipe run (on page 72)
- Route a pipe run to a specific coordinate location (on page 73)
- Route a pipe run at specified distance (on page 73)
- Route a pipe run at specified distance and direction (on page 74)
- Route a pipe run with an offset (on page 74)
- Copy a pipe run (on page 75)
- Extend an existing pipe run (on page 75)
- Extend an existing arc pipe (on page 75)
- Merge pipe runs (on page 76)

- Choose a working plane (on page 77)
- Select pipe run settings (on page 78)
- Change the flow direction of a pipe run (on page 78)
- Route a branch at a specific angle (on page 79)
- Route a pipe from R3D nozzle (on page 79)
- Convert turn feature to an arc (on page 80)
- Place a tee from a P&ID (on page 80)
- Place a nozzle from a P&ID (on page 80)
- Model from a P&ID (on page 81)
- Correlate existing equipment for use in an integrated environment (on page 82)
- Correlate new equipment for use in an integrated environment (on page 82)
- Update equipment for use in an integrated environment (on page 83)
- Manually correlate multiple Smart 3D pipe runs/pipelines with a P&ID pipe run/pipeline (on page 83)
- Compare design basis with the model (on page 84)
- Remove correlation with design basis (on page 85)

Create a new pipe run

- 1. Click **Route Pipe** \mathcal{P} on the vertical toolbar.
- 2. Select the run starting point.

TIPS

- If you select a feature located at the end of an existing run, the software continues the run of the selected feature. Skip to step 5.
- If you select an equipment nozzle, a point in space, a tap, a branch port, or a point along a straight feature, the software prompts you to create a new pipe run.
- If you select an equipment nozzle that is correlated with P&ID design basis data, the software automatically determines which run should be connected.
- 3. On the **New Pipe Run** dialog box, type a name for the **Pipe Run**. If you do not type a name, the software automatically generates a name.
 - Select pipe run settings (on page 78)
- 4. Click **OK** to close the **New Pipe Run** dialog box.
- 5. Select points to define the route of your pipe run.
 - TIP You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.

6. Select the ending point of the pipe leg. Right-click to end routing the pipe run.

■ NOTES

- You can continue routing an existing run by selecting a run end feature or by selecting the run name from the list of available runs.
- If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting
 Temperature and Pressure from the Category option.

Create an arc pipe run

- 1. Click **Route Pipe 7** on the vertical toolbar.
- 2. Click **Arc Routing** and on the horizontal ribbon.
- 3. Click **Start Point** and click to set the run starting point.
- 4. On the **New Pipe Run** dialog box, type a name for the **Pipe Run**. If you do not type a name, the software automatically generates a name.
 - Select pipe run settings (on page 78)
- 5. Click **OK** to close the **New Pipe Run** dialog box.
 - TIP If you are connecting the arc pipe to an existing run, select its name from the Run box.
- 6. Type the **Arc radius** in the corresponding box.
- 7. Click **Center Point** 3, and click to set the run center point.
- 8. Click **End Point** $\stackrel{\text{loc}}{\longrightarrow}$, and click to set the run end point.
- 9. Type the **Arc angle** in the corresponding box.
- 10. Click **Finish** to place the arc pipe.

Create a new pipe run from a P&ID run

- 1. Click **SmartPlant > Retrieve** to retrieve the P&ID drawing that contains the run that you want to route. You can skip this step if the P&ID has already been retrieved.
- Click SmartPlant > View P&ID to view the P&ID drawing that contains the run that you want to route.
- 3. Click Route Pipe \overline{Y} on the vertical toolbar.
- 4. In the Run list on the ribbon bar, select <Select from P&ID>.
- 5. Select the run to route from the P&ID drawing.
- The New Pipe Run dialog box appears with properties populated from the design basis.
 Click OK to accept the properties given. This step saves the correlated run information and closes the New Pipe Run dialog box.
- 7. Select points to define the route of your pipe run.

TIPS

- If process data was not defined on the P&ID, then you must manually type a temperature and pressure.
- You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.
- If you select an equipment nozzle that is correlated with P&ID design basis data, the software automatically determines which run should be connected.
- 8. Select the ending point of the pipe run. Right-click to end a pipe run that does not terminate in a nozzle or branch.
- **NOTE** Your plant must be registered with the Smart 3D integrated environment to use this procedure.

Route pipe across P&ID off-page connectors

- 1. Click **SmartPlant > Retrieve** to retrieve the P&IDs that contain the runs to route. You can skip this step if the P&IDs have already been retrieved.
- Click SmartPlant > View P&ID to view the P&ID that contains the first part of the run to route.
- 3. Select All or Piping Runs in the Locate Filter.
- 4. Click **Route Pipe** \overline{Y} on the vertical toolbar.
- 5. In the Run pull-down list on the ribbon bar, select <Select from P&ID>.
- 6. From the P&ID drawing, select the run to route.
- 7. The **New Pipe Run** dialog box appears with properties populated from the design basis. Click **OK** to accept the properties given. This step saves the correlated run information and closes the **New Pipe Run** dialog box.
- 8. Select points to define the route of your pipe run.
 - TIP You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.
- 9. Right-click to end a pipe run in space (not terminated on a nozzle or branch).
 - **NOTE** After routing, notice that the correlation color in the P&ID Viewer does not show a data match. This mismatch is because the second part of the run noted through the off-page connector has not yet been routed and correlated. The off-page connector displays the corresponding P&ID to find the matching connector.
- Click SmartPlant > View P&ID to view the corresponding P&ID noted by the previous drawing.
- 11. Click **Route Pipe** \overline{Y} on the vertical toolbar.
- 12. In the Run pull-down list on the ribbon bar, select <Select from P&ID>.
- 13. Select the other side of the run to route from the corresponding P&ID.
- 14. The **New Pipe Run** dialog box appears with properties populated from the design basis. Click **OK** to accept the properties given, which saves the correlated run information and closes the **New Pipe Run** dialog box.

15. Route the run to the end of the first pipe run. Because the software places a weld when the two ends are connected, you should choose an appropriate location along the pipe run for the weld caused by the off-page connector. This prevents unnecessary welds from being created.

Place components while routing pipes

- 1. Click **Route Pipe** \overline{Y} on the vertical toolbar.
- 2. Select the run starting point.

TIPS

- If you select a feature located at the end of an existing run, the software continues the run of the selected feature. Skip to step 5.
- If you select an equipment nozzle, a point in space, or a point along a straight feature, the software prompts you to create a new pipe run.
- 3. On the **New Pipe Run** dialog box, type a name for the **Pipe Run**. If you do not type a name, the software automatically generates a name.
- 4. Specify the pipe run settings. For more information, see *Select pipe run settings* (on page 78).
- 5. Click OK to close the New Pipe Run dialog box.
- 6. Select points to begin routing your pipe run.
- 7. Click **Insert Component** when you want to insert a component.
- 8. Place the component. For more information, see *Insert a component* (on page 140).
- 9. Select the ending point of the pipe run. Right-click to end a pipe run.

NOTE You can continue routing an existing run by selecting a run end feature or by selecting the run name from the list of available runs.

Place splits while routing pipes

- 1. Click **Route Pipe %** on the vertical toolbar.
- 2. Select the run starting point.

TIPS

- If you select a feature located at the end of an existing run, the software continues the run of the selected feature. Skip to step 5.
- If you select an equipment nozzle, a point in space, or a point along a straight feature, the software prompts you to create a new pipe run.
- 3. On the **Pipe Run** dialog box, type a name for the **Pipe Run**. If you do not type a name, the software automatically generates a name.
 - Select pipe run settings (on page 78)
- 4. Click **OK** to close the **New Pipe Run** dialog box.
- 5. Select points to begin routing your pipe run.

- 6. Click **Insert Component** when you want to insert a component.

 Insert a component (on page 140)
- 7. Select the ending point of the pipe run. Right-click to end routing.
- **NOTE** You can continue routing an existing run by selecting a run end feature or by selecting the run name from the list of available runs.

Route a sloped pipe run

- 1. Click Route Pipe \overline{Y} on the vertical toolbar.
- 2. Select the run starting point in an elevation view.
- 3. On the New Pipe Run dialog box, select the parent Pipeline.
- 4. In the **Name** box, type a name for the pipe run. If you do not type a name, the software automatically generates a name.
- 5. Select the **Minimum Slope** box, and then type the slope for the pipe run. For example, **2** deg or **0.5in / 1.0ft**.
- 6. Click **OK** to close the **New Pipe Run** dialog box.
- 7. In the **Specify Slope Direction** dialog box, specify if you are routing from the high point or the low point of the pipe run.
- 8. Click **OK** in the **Specify Slope Direction** dialog box.
- 9. Select points to define the route of your pipe run.
 - TIP You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.
- 10. Select the ending point of the pipe run. Right-click to end routing.

■ NOTES

- You can unlock the slope on the ribbon to temporarily override the slope. For example, you will need to unlock the slope to model a vertical drop in the pipe run.
- If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting
 Temperature and Pressure from the Category option.
- To modify the slope of a pipe run, delete the pipe run and create a new pipe run with the modified slope value.

Adjust the slope to keep the pipe run within the slope tolerance

When you move sloped pipe run components, connected components can move out of the minimum slope tolerance. This often happens when you move a loop or change the slope tolerance on an existing pipe run. To adjust the components so that they are within the minimum slope tolerance, use the following procedure:

- 1. Select the turn feature (typically an elbow) to move. For example, you may need to move an elbow so that the attached pipe slope is within the slope tolerance.
- Click Modify Slope

The **Modify Slope** dialog box displays. For more information, see Modify Slope Dialog Box (on page 98).

- 3. Select the pipe run to change.
- 4. Select a slope from the list that puts the component within the minimum slope tolerances.
- 5. Click OK.

Smart 3D changes the slope of the component.

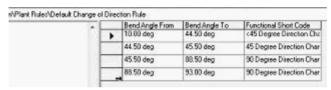
TIP You must repeat this procedure for each component that needs to change.

Adjust the Default Change of Direction rule for sloped piping

- ★ IMPORTANT The Catalog must contain appropriate bend angles in the **Default Change of Direction** rule for Smart 3D to correctly place turn fittings for sloped pipe runs.
- 1. Click Task > Catalog.

Catalog opens.

- 2. Navigate to **Default Change of Direction Rule**.
- 3. Adjust the **Bend Angle From** and **Bend Angle To** values as necessary so that the bend angles account for the slope variation.



- 4. Bulkload any changed bend angles. For more information, see *Loading Reference Data into the Catalog* in the *Reference Data Guide*.
- 5. Click Task > Piping.

Piping opens.

6. Route the sloped pipe.

Smart 3D calculates the appropriate turn fittings for the sloped pipe run.

TIPS

- When routing a sloped pipe, use a slope value that is larger than the Minimum Slope for the pipe run to avoid *Invalid Slope Angle* To-Do-Record (TDR). The software compares design slope and minimum slope of the pipe run. If there is a difference between the values caused by any modification, the software generates a TDR.
- If you route the pipe run and allow Smart 3D to automatically place the elbows, Smart 3D can calculate modifications to the pipe run later in the design cycle. Make sure that the elbows you use in sloped piping are trimmable (that is, you can change the bend angle).

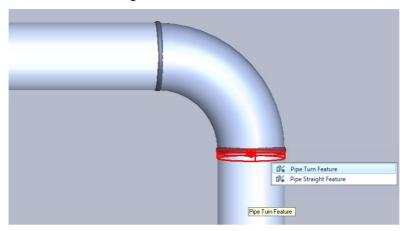
Remove small miter fittings

Small miters form when you place 90 degree elbows on sloped pipes and then route pipe from the end of the elbow instead of letting Smart 3D create elbows based on the angle between the pipes.

NOTE Sloped piping typically needs trimmable elbows. If there are no trimmable elbows in the Catalog, Smart 3D cannot adjust the angle for sloped piping.

Use the following procedure to remove these small miter fittings:

1. Select the miter fitting.



The angle for the small miter fitting displays in the Angle 1 box.

2. Type **0** in the **Angle 1** box.

Smart 3D removes the miter and adjusts the angle and orientation of the fitting to accommodate the sloped piping.

Route a multi-sloped pipe run

- 1. Click **Route Pipe 7** on the vertical toolbar.
- 2. Select the run starting point in an elevation view.
- 3. On the New Pipe Run dialog box, select the parent Pipeline.
- 4. In the **Name** box, type a name for the pipe run. If you do not type a name, the software automatically generates a name.
- Select the Minimum Slope box, and then type the slope for the pipe run. For example, 2 deg or 0.5in / 1.0ft.
- 6. Click **OK** to close the **New Pipe Run** dialog box.
- 7. In the **Specify Slope Direction** dialog box, specify if you are routing from the high point or the low point of the pipe run.
- 8. In the **Specify Slope Direction** dialog box, select **Run contains multiple slope orientation** to indicate that the pipe run will slope both up and down.
- 9. Click **OK** on the **Specify Slope Direction** dialog box.
- 10. Select points to define the route of your pipe run.
 - *TIP You can use PinPoint, Point Along, and the SmartSketch3D relationship indicators when defining your pipe run.
- 11. When you are finish routing in that particular direction (for example, sloping down). Right-click to end routing.

- 12. Click Route Pipe 📝 again.
- 13. In the Run box on the ribbon, select <New/ Continue Run>.
- 14. Select the pipe end feature where you stopped in step 11.
- 15. In the **Specify Slope Direction** dialog box, specify the other direction.
- 16. Click **OK** on the **Specify Slope Direction** dialog box.
- 17. Select point to define the route of your pipe run.
- 18. Repeat steps 11 through 17 until you have completed the pipe run route.

★ IMPORTANT The Run contains multiple slope orientations option on the Specify Slope Direction dialog box indicates that the pipe run slopes both up and down. After you specify that a pipe run has multiple slope orientations, you cannot clear the selection. You should only route pipe runs with multiple slope orientations when it is absolutely required. In addition, pipe runs with multiple slope orientations may behave unexpectedly during modification operations.

Route a pipe run to a specific coordinate location

- 1. Click Tools > PinPoint.
- 2. Select the coordinate system that contains the location to which you want to route.
- Select the Rectangular Coordinates option on the PinPoint ribbon.
- 4. Click **Route Pipe 7** on the vertical toolbar.
- 5. Select the run starting point.
- 6. Define the pipe run properties on the **New Pipe Run** dialog box, and then click **OK**.
- 7. Select the **Set Target to Origin** option on the PinPoint ribbon to move the **PinPoint** target to the specified coordinate system's origin.
- 8. In the **PinPoint** ribbon, type the easting, northing, or elevation coordinates to which you want to route.
- 9. Click in the view to route the pipe run to the specified point.

■ NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting Temperature and Pressure from the Category option.

Route a pipe run at specified distance

- 1. Click Tools > PinPoint.
- 2. Select the **Relative Tracking** % option on the **PinPoint** ribbon.
- 3. Select the **Rectangular Coordinates** \bigcirc option on the **PinPoint** ribbon.
- 4. Click **Route Pipe 7** on the vertical toolbar.
- 5. Select the run starting point.
- 6. Define the pipe run properties on the New Pipe Run dialog box, and then click OK.

- 7. In the **PinPoint** ribbon, type the easting, northing, or elevation distance (from the **PinPoint** target) to route the pipe run.
- 8. Click in the view to route the pipe run to the specified point. The software moves the **PinPoint** target to the new location.
- In the **PinPoint** ribbon, type the easting, northing, or elevation distance to route the pipe run.
- 10. Continue defining points as needed.
- 11. Select the ending point of the pipe run. Right-click to end a pipe run.

■ NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. You do this by selecting Temperature and Pressure from the Category option.

Route a pipe run at specified distance and direction

- 1. Click Tools > PinPoint.
- 2. Select the **Relative Tracking** % option on the **PinPoint** ribbon.
- 3. Select the **Spherical Coordinates** \oplus option on the **PinPoint** ribbon.
- 4. Click **Route Pipe** \overline{Y} on the vertical toolbar.
- 5. Select the run starting point.
- 6. Define the pipe run properties on the New Pipe Run dialog box, and then click OK.
- 7. In the **PinPoint** ribbon, type the absolute distance and direction to route.
- 8. Click in the view to route the pipe run to the specified point. The software moves the **PinPoint** target to the new location.
- 9. Continue defining points as needed.
- 10. Select the ending point of the pipe run. Right-click to end a pipe run.

■ NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting Temperature and Pressure from the Category option.

Route a pipe run with an offset

- 1. Click **Route Pipe** \overline{Y} on the vertical toolbar.
- 2. Select the run starting point.
- 3. Define the pipe run properties on the **New Pipe Run** dialog box, and then click **OK**.
- 4. From the Offset option, select Set Offset Reference.
- 5. Select the option to use from the **Measured from** field.
- 6. Type the offset distance to use in the Offset box.
- 7. Click **OK** on the **Set Offset Reference** dialog box.

- 8. Select the appropriate route plane. The offset glyph does not appear if you do not set a plane.
- 9. Move the cursor over the object in the model from which you want to measure the offset until the object is added to the SmartSketch3D locate list. This glyph appears.
- 10. Move the cursor until the offset line and glyph ② appear, and then click to route the pipe run.
- 11. Select the ending point of the pipe run. Right-click to end routing.

■ NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. You do this by selecting Temperature and Pressure from the Category option.

Copy a pipe run

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Runs in the Locate Filter.
- 3. Select the pipe run to copy.
- 4. Click Edit > Copy.
- 5. Select a from point for the copied objects.
- 6. Click Edit > Paste.
- 7. Clear the **Paste in place** option if it is selected.
- 8. Identify a location in the model for the copied pipe run.

NOTE The copied pipe run must be collinear a pipe run end or nozzle, the system automatically connects the two. If you are copying a branch pipe run, then the branch end must be orthogonal to the header pipe run. If the copied pipe run is not collinear or orthogonal to the pipe run, the software does not make a connection.

Extend an existing pipe run

- 1. Click **Route Pipe** \overline{Y} on the vertical toolbar.
- 2. Select the end feature from which to extend the pipe run.
- 3. Route the pipe run as needed.

Extend an existing arc pipe

- 1. Click **Route Pipe %** on the vertical toolbar.
- 2. Click **Arc Routing** \supseteq to change the route mode from straight to arc.
- 3. Select the end feature from which to extend the arc pipe run.
- 4. Select a center point to specify the direction and normal for the arc.

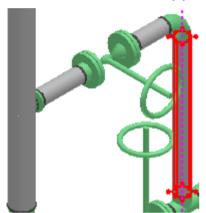
5. Type the arc radius. If you need to route the arc with the same radius, select **Maintain Same Radius** in the **Arc Radius** drop-down list.

The center point is adjusted according to the radius value.

- 6. Select the end point.
- 7. In the Arc Angle, key in the required angle.
- 8. Route the arc pipe as needed.

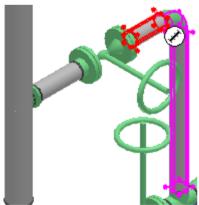
Merge pipe runs

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the end feature of the pipe run you want to merge (delete).



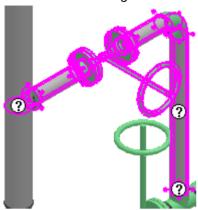
- 4. Press and hold the SHIFT key.
- 5. Select the end feature at the other end of the pipe run you want to merge.

The software automatically selects all the features between the two features that you selected.



- 6. In the Run box on the ribbon, select < Select Graphically>.
- 7. In a graphic view, select the pipe run to which you want the selected pipe features assigned.

The software re-assigns the selected pipe features to the newly identified pipe run.



- 8. Select Piping Runs in the locate filter.
- 9. In the Workspace Explorer, find the now empty pipe run and delete it.
 - TIP If other objects, such as pipe supports, are still assigned to the "empty" pipe run (the run with no piping features), you will need to move these item to the merged pipe run prior to deleting the empty pipe run.

NOTE If the flow direction of the newly merged pipe run is corrupt, you can use the **ValidateFlowDirCmd.ValidateFlowDir** custom command to search for and fix corrupt flow directions in your model. In case of flow direction inconsistency, a warning message is displayed. Contact support with this message.

Choose a working plane

- 1. Click **Plane** on the ribbon.
- 2. Select the routing plane for your pipe run.

Plane Options

- Plan Plane Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- Elevation Plane: East-West Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.
- Elevation Plane: North-South Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- Plane by Turn/Branch Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
- Plane by Three Points Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
- No Plane Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

NOTE When you select a routing plane, the software highlights the plane in the model.

Select pipe run settings

- 1. On the **New Pipe Run** dialog box, choose the pipeline for the new run in the **Pipeline** box.
 - TIP The **Pipeline** box lists up to the last ten selected pipelines. Choosing the **More** option at the bottom of the list allows you to browse all pipelines in the model.
- 2. Optionally, in the Name box, type the name of the new pipe run that you are creating.
- 3. Set the specification of the new pipe run in the **Specification** box.
- 4. In the **Nominal Diameter** box, select the NPD for the pipe run.
- 5. Set other pipe run properties as needed.
- 6. Click **OK** to return to the **Route Pipe** command.

■ NOTES

- Use the Category option to view more properties that you can set for the pipe run.
- If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting Temperature and Pressure from the Category option.

Change the flow direction of a pipe run

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Runs in the Locate Filter.
- 3. Select the pipe run for which you want to change the flow direction.
- 4. Click one of the flow direction indicators that appear on the pipe run.
- 5. Select a new flow direction on the **Flow** dialog box.

■ NOTES

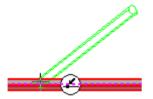
- The flow directional indicators are listed below:
 - Bi-directional
 - O Upstream
 - Downstream
 - No flow
 - ① Undefined
- You also can click Properties on the ribbon to edit the flow direction property of a run.

Route a branch at a specific angle

- 1. Click **Route Pipe 7** on the vertical toolbar.
- 2. Select the branch run starting point (the end not connected to the header).



3. Select a point on the header at approximately the correct angle and direction that you want.



- 4. In the Locate Filter, select Piping Features.
- 5. Select the Pipe Along Leg Feature where the branch connects to the header. You will probably need to use Quick Pick in order to select the correct feature.
- 6. In the **Angle 1** box on the ribbon, type the actual angle that you want the branch to connect to the header.

■ NOTE If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the branch. Do this by selecting Temperature and Pressure from the Category option.

Route a pipe from R3D nozzle

- ★ IMPORTANT Prior to routing a pipe, make sure that your Reference 3D model attributes are mapped to corresponding Smart 3D attributes.
- 1. Click **Route Pipe 7** on the vertical toolbar.
- 2. Move the mouse pointer over the Reference 3D nozzle until the **Circle 3d** glyph appears, and then click to route the pipe run.
- 3. On the New Pipe Run dialog box, select the parent Pipeline.
 - **NOTE** If there are no pipeline systems defined in **Workspace Explorer**, then create a new pipeline system or select a pipeline system from the database to which you want to associate the new pipe run.
- 4. In the **Name** box, type a name for the pipe run. If you do not specify a name, the software automatically generates a name.
- 5. On the **Reference 3D** tab, fill all the required properties. You can also edit the existing properties as needed. For more information see, *Reference 3D Tab* (on page 94).

- 6. Click OK to close the New Pipe Run dialog box.
- 7. Select the end point of the pipe run, and then right-click to end routing.

Convert turn feature to an arc

- 1. Select a pipe turn feature.
- 2. Right-click on the turn feature.
- 3. On the right-click menu, select Convert Turn to Arc.

NOTE After you convert a turn feature to arc, you can revert to turn feature. Right-click the arc feature, and select **Convert Arc to Turn** on the right-click menu.

Place a tee from a P&ID

- 1. Click **SmartPlant > Retrieve** to retrieve the P&ID drawing that contains the pipe runs for that branch. You can skip this step if the P&ID has already been retrieved.
- 2. Click **SmartPlant > View P&ID** to view the P&ID drawing that contains pipe runs.
- 3. Review the P&ID to determine where you need to insert the tee or branch in the model. Specifically, you need to identify the header and branch pipe runs.
- 4. Click Insert Component and on the vertical toolbar.
- 5. Select the header run in which to insert the tee or other branch component.
- 6. Select the component type and the option in the **Type** and **Option** boxes.
- 7. Position the component on the header pipe run.
- 8. Click Finish.
- 9. Using the **Route Pipe** command, route the branch pipe run into the branch component that you just placed on the header pipe run.
- TIP As you model and branch into a header line, a tee is automatically generated by the software.

Place a nozzle from a P&ID

- 1. Click **SmartPlant** > **Retrieve** to retrieve the P&ID that contains the nozzle to place. You can skip this step if the P&ID has already been retrieved.
- 2. Click **SmartPlant** > **View P&ID** to view the P&ID that contains the nozzle to place.
- 3. In the P&ID, select the nozzle to place in the model.
- 4. Click **Place Nozzle** ** on the vertical toolbar.
- 5. Select the equipment or designed equipment object on which to place the nozzle.
 - TIP You can either select the shape in a graphic view, or you can select it in the Workplace Explorer.

The Nozzle Properties dialog box appears.

- 6. Verify that the property values defined on the **Occurrence** tab are correct as compared to the nozzle report.
- 7. On the **Location** tab, specify the placement type and type values for the location parameters as needed.
- 8. Click OK.

The **Nozzle Properties** dialog box closes, and you return to the model with the nozzle placed.

- Click SmartPlant > Compare Design Basis, and verify the correlation status of the nozzle in the model.
- 10. If necessary, click **Copy properties from design basis**, and then click **Update** to transfer data in the P&ID to match the 3D model object.

■ NOTES

- The software automatically sets all mapped nozzle properties in the 3D model as defined by the currently selected P&ID nozzle.
- After the nozzle is placed in the 3D model, it can be moved without affecting the correlation. If it is deleted, it does not delete the P&ID design basis object.
- Correlation is a relationship between an object in the 3D model and the corresponding object in the P&ID. For example, a nozzle in the 3D model is related to a nozzle in the P&ID.
- The occurrence properties of the nozzle object in the 3-D model that are not correlated with corresponding properties in the design basis object (that is, the nozzle in the P&ID) can be edited without changing the correlation status.

Model from a P&ID

- 1. Click **SmartPlant** > **Retrieve** to retrieve the P&ID that contains the pipe to place. You can skip this step if the P&ID has already been retrieved.
- 2. Click **SmartPlant** > **View P&ID** to view the P&ID that contains the pipe to place.
- 3. In the P&ID, select the point from which to start modeling.

The point highlights in the model.

- 4. Click **Tasks > Piping** to start the Piping task if necessary.
- Click Route Pipe \(\sum_{\circ} \).

If the object from which you are routing is already correlated, the **New Pipe Run** dialog box displays with the parameters associated with the pipe run.

- 6. Click **OK** on the **New Pipe Run** dialog box.
- 7. Route the pipe to meet your requirements.

■ NOTES

You can insert components while you are routing pipe. With the Route Pipe command active, click Insert Component in, and then select the component from the P&ID. Click Finish on the Insert Components ribbon bar. The software inserts the component on the

end of the run and then continues with the **Route Pipe** command. Do not right-click to reset the command, or you must restart the command.

You can insert components after you route pipe. Click **Insert Component**, select the run, and then select the component from the P&ID. Click **Finish** on the **Insert Components** ribbon to place the component in the model. If the attribute information has already been retrieved, the software places that component. If the attribute information has not been retrieved, the software displays an error message telling you that the component cannot be located.

Correlate existing equipment for use in an integrated environment

If the nozzles exist on the equipment before you correlate, then the software attempts to correlate the nozzles automatically. Otherwise, you must correlate existing equipment in two processes. First, correlate the body. Then, correlate the nozzles in a separate process.

Correlate the Body

- 1. Select Correlate with Design Basis.
- 2. Select the main equipment body.
- 3. Select the equipment on the P&ID.

Correlate the Nozzles

- 1. Select Correlate with Design Basis.
- 2. Select a nozzle on the equipment.
- 3. Select the corresponding nozzle on the P&ID.

► NOTE If the nozzle names in the 3D model and the names identified in the P&ID match, then the nozzles correlate to the correct state. If there are any discrepancies, you can view them using the SmartPlant > Compare Design Basis command.

Correlate new equipment for use in an integrated environment

- 1. Select the equipment from the P&ID.
- 2. Select **Place Equipment** to create the equipment folder, and select the matching equipment by type using the catalog.
- 3. Place the shape, and select the equipment parent.
- 4. Select the nozzle from the P&ID.
- 5. Click Place Nozzle 3.
- 6. Select the designed equipment parent for the nozzle.
- 7. Position the nozzle on the equipment.

■ NOTE You must type all of the size, end preparation, termination class, and rating practice information for the first nozzle that you place. The software reads all subsequent nozzle information directly from the P&ID.

Update equipment for use in an integrated environment

- 1. Click Compare Design Basis.
- Select the equipment folder from the Workspace Explorer, or select the symbol from the P&ID.
- 3. Click Update.

■ NOTES

- Updating adjusts all of the nozzles associated with the main body as well as the equipment body itself. The nozzles and the equipment appear highlighted in the Workspace Explorer. If they are not highlighted then you can select the equipment in the Workspace Explorer and choose Select Nested. Then, select SmartPlant > Compare Design Basis. Select Update to update the equipment and all associated nozzles.
- If you change dimensions or names of a nozzle, then you must update that nozzle separately.

Manually correlate multiple Smart 3D pipe runs/pipelines with a P&ID pipe run/pipeline

If a P&ID pipe run or pipeline is split into multiple pipe runs or pipelines in Smart 3D, you can use the following procedure to manually correlate these multiple Smart 3D piping objects to the single P&ID pipe run or pipeline.

NOTE If you are correlating pipelines, ensure to set the filter to **Pipelines**; likewise, for pipe runs, set the filter to **Piping Runs**. This is because you cannot select pipelines in P&ID and the software uses the filter to determine what kind of piping objects you are correlating.

- 1. Click **SmartPlant > Retrieve** to retrieve P&ID data into the software.
- 2. Open the P&ID in the P&ID File Viewer.
- 3. Click SmartPlant > Correlate with Design Basis.
- 4. Select an object in the 3D model that you want to correlate.
- 5. In the **P&ID File Viewer**, select the object that you want to correlate.

The software detects whether the P&ID object is already correlated to one or more 3D object. When you see the following message, click **Yes** to continue.

Selected Design Basis object is already correlated to another 3D object. Are you sure you want to correlate more than one 3D object the same Design Basis object?

■ NOTE If you click **No**, the software un-correlates the existing correlated run, and then correlates the new run.

- 6. Review the **Correlate with Design Basis** dialog box, set correlating options as needed, and click **Update**.
- 7. Review discrepancies between the Smart 3D piping object and the design basis using the **SmartPlant > Compare Design Basis** command.
 - TIP The Compare Design Basis command helps you to determine if there are missing correlations to the P&ID piping object.

Repeat steps 3 through 6 to correlate more Smart 3D objects to the P&ID piping object. When all related objects in the 3D model are correlated with the P&ID piping object, the **Correlation Status** property of these 3D objects shows **Correlated with data consistency**.

Compare design basis with the model

The **Compare with Design Basis** command allows you to resolve discrepancies between an object in the 3D model and the design basis.

- 1. Click **SmartPlant > Retrieve** to retrieve data into the software.
- 2. Click SmartPlant > View P&ID to open the P&ID that contains the data that you retrieved.
- 3. Select an object on the P&ID or in the model.
- 4. Click SmartPlant > Compare Design Basis.
- 5. Review the **Properties** tab for highlighted objects that have a discrepancy between the P&ID and the three-dimensional model. Objects that do not match appear in a different background color (red).
- 6. Review the **Topology** tab to check for differences in shapes between the P&ID and the 3D model. This tab is available only for objects that support correlation.
 - TIP When you select a pipe run, the **Topology** tab indicates objects that are correlated and in the same order on the pipe run, as well as objects that are correlated and not in the same order on the pipe run.
- 7. Click **Close** if you do not want to update the properties from design basis.

-OR-

After you correct the errors that cause the discrepancy, click **Update** on the **Compare with Design Basis** dialog box to transfer data from the design basis object to the 3D model object and update properties that are out-of-date. The **Design Basis Value** and the **Model Value** columns change to show the new values.

TIPS

- Clicking Update changes the property values. You can selectively update properties by selecting associated check boxes. For more information see, Properties Tab (Compare with Design Basis Dialog Box).
- For certain exceptions, the software does not process an update. For example, an object that is not mapped with properties is not updated.

When you have finished your review, click **Close**.

Remove correlation with design basis

Removes correlation from a 3D model object to a design basis object.

- 1. Select SmartPlant > Remove Correlation with Design Basis.
 - The software prompts you to select correlated objects.
- 2. Select objects using Inside Fence and Overlapping Fence ...
- Click Finish.

The software filters the correlated objects from the selected 3D objects and un-correlates the correlated objects.

New Pipe Run Dialog Box

Creates a new pipe run in your model using properties that you specify. You can access the **New Pipe Run** dialog box by selecting **<New Pipe Run>** from the **Run** option on the ribbon bar.

Defaults for the new pipe run can be inherited from the pipe run you are connecting to, from a P&ID in an integrated environment, or from the grandparent piping system default properties values as defined in the Systems and Specifications task.

■ NOTE Quick Route III currently does not support inheriting pipe run properties from a P&ID.

Pipe run properties are divided into several different categories: **Standard**, **Testing**, **Temperature and Pressure**, **Surface Treatment and Coating**, **Insulation and Tracing**, and **Responsibility**. You can select the category that you want to define values for by using the **Category** option.

Property Defaults Source

These four commands indicate and control the default properties for the new pipe run. If you click a command that is active, the default properties of that system or object are used. Default properties from the design basis have the highest priority.

B Piping System

Uses the default properties on the parent piping system.

Pipeline System

Uses the default properties on the parent pipeline system.

Pipe Run

Uses the default properties from an existing pipe run.

Last Used

Uses the last saved properties for the pipe run.

Standard

Pipeline

Select the pipeline system to which you want the pipe run to belong. The last pipeline system that you selected is the default. Select **More** to display all defined pipeline systems. You can create a new pipeline in the Systems and Specifications task.

Name

Displays the name of the pipe run. The pipe run name is based on the **Name Rule** selection. If you specify a name in this box, the software automatically sets the **Name Rule** box to **User Defined**.

Name Rule

Specify the naming rule to name this pipe run. You can select one of the listed rules or specify the pipe run name yourself in the **Name** box.

Specification

Select the pipe specification that you want to control this pipe run. Only those pipe specifications that are allowed in the pipeline that you selected appear. You assign pipe specifications to pipeline systems in the System and Specifications task. You define pipe specifications in the reference data. See the *Piping Reference Data Guide* for more information on defining pipe specifications.

Nominal Diameter

Select the nominal pipe diameter (NPD) for the pipe run. The pipe specification controls the available NPDs in this list. If you select an equipment nozzle as the starting point of your pipe run, the software automatically uses the NPD of the nozzle as the NPD of the pipe run. You can select the NPD units to display on a session file basis using the **Tools** > **Options** command on the **Units of Measure** tab.

Flow Direction

Select the flow direction for the pipe run. If you select an equipment nozzle as the starting point of your pipe run, the software automatically uses the flow direction of the nozzle as the flow direction of the pipe run.

Pipe Run Type

Specifies the type of pipe run that is routed. Select **Core Pipe Run** to route a core pipe run. Select **Jacket Pipe Run** to route a jacketed pipe run. The default value is **Undefined** for a non-jacketed pipe run. This property is used to differentiate a core pipe run and a jacketed pipe run.

Minimum Slope

Displays the minimum slope allowed for the pipe run. You can specify the slope as a ratio, a percentage, or in degrees.

- As a ratio, if a run drops 1/4" for every foot of horizontal distance, specify the slope as 1/4"/1'-0".
- As a percentage, if a run drops 1" for every 10" of horizontal distance, specify the slope as 10%.
- In degrees, a five-degree slope can be specified as 5deg.

NOTE When routing a sloped pipe, use a slope value that is larger than the **Minimum Slope** for the pipe run to avoid *Invalid Slope Angle* To-Do-Record (TDR). The software compares design slope and minimum slope of the pipe run. If there is a difference between the values caused by any modification, the software generates a TDR.

Slope Direction

Displays the direction type of the pipe run slope. If it is set to **Single**, the pipe run slopes either up or down. You can change this to **Multiple** if needed. If it is set to **Multiple**, the pipe run can slope both up and down. You cannot change this setting back to **Single** once **Multiple** is selected.

Schedule Override

Displays the thickness override for parts in the pipe run. If the piping specification rules do not allow you to override components, then the software disables this option.

Correlation Status

Displays whether the pipe run has been correlated to a pipe run in a P&ID.

Correlation Basis

Displays if the pipe run is required to be correlated to a P&ID pipe run. Select **Correlate object** if the pipe run has a correlating pipe run in a P&ID. Select **No correlation is required** if the pipe run does not have a correlating pipe run in a P&ID.

Correlation Approval Status

Displays if the component is approved with discrepancies in the three-dimensional data compared with design basis data. Select **Topology mismatch approved** if the topology mismatch of components can be ignored. Select **Data and Topology mismatches approved** if the data and topology mismatches of components can be ignored. Select **None** if you do not want to approve a mismatch.

Testing

Testing Requirements

Specifies the type of non-destructive testing required for welds. To change the options on the list, edit the **Testing Type** select list in Catalog.

Testing Type

Specifies the type of non-destructive weld testing for the welds. To change the options on the list, edit the **Testing Type** select list in Catalog.

Testing Percentage

Specifies the percentage of the welds on this pipe run that are to be tested. This option is available only if you are viewing pipe run properties.

Temperature and Pressure

★ IMPORTANT

Temperature and pressure values are controlled by UndefinedServiceLimitsruleOpt, which is available on the DefaultProjectOptions sheet in the Piping Specification.xls workbook. If this option is set to 5, then you must specify temperature and pressure values for all the pipe runs. If this option is set to 10, the software displays a warning: "No Temperature and pressure data has been defined for the pipe run being modeled. As a

result, compliance with the temperature/pressure service limits as defined in the piping specification cannot be confirmed. Do you want to continue modeling the pipe run anyway?"

• If your pipe specifications are material-driven, it is still recommended that you specify at least one set of temperature and pressure values for the pipe run.

Design Maximum Temperature

Specifies the maximum design temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Design Minimum Temperature

Specifies the minimum design temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Design Maximum Pressure

Specifies the maximum design pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Operating Maximum Temperature

Specifies the maximum operating temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Operating Minimum Temperature

Specifies the minimum operating temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Operating Maximum Pressure

Specifies the maximum operating pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Testing Maximum Temperature

Specifies the maximum testing temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Testing Minimum Temperature

Specifies the minimum testing temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Testing Maximum Pressure

Specifies the maximum testing pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Design Minimum Pressure

Specifies the minimum design pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Operating Minimum Pressure

Specifies the minimum operating pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Testing Minimum Pressure

Specifies the minimum testing pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

Insulation and Tracing

Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Specification box, you cannot change the information in the **Insulation Purpose** box. However, if **Insulation Specification** is manually defined, you can select the purpose of the insulation in this box. If **Insulation Specification** is a selected reference data insulation specification, the software reads the purpose from the insulation specification from the reference data and displays it here.

To change the options on the list, edit the **Insulation Purpose** select list in Catalog.

Insulation Material

Specification box, you cannot change the information in the **Insulation Material** box. However, if **Insulation Specification** is manually defined, you can select the insulation material to use. If **Insulation Specification** is a selected reference data insulation specification, the software reads the material from the insulation specification as defined in the reference data and displays it here.

Select **More** to select an insulation material from the Catalog. To change the options on the list, edit the **Insulation Material** select list in Catalog.

Insulation Thickness

Specification box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of temperature (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius, for example).

Responsibility

Cleaning Responsibility

Specifies the party responsible for cleaning the object. To change the options on the list, edit the **Cleaning Responsibility** select list in Catalog.

Design Responsibility

Specifies the party responsible for designing the object. To change the options on the list, edit the **Design Responsibility** select list in Catalog.

Fabrication Responsibility

Specifies the party responsible for fabricating the object. To change the options on the list, edit the **Fabrication Responsibility** select list in Catalog.

Installation Responsibility

Specifies the party responsible for installing the object. To change the options on the list, edit the **Installation Responsibility** select list in Catalog.

Painting Responsibility

Specifies the party responsible for painting the object. To change the options on the list, edit the **Painting Responsibility** select list in Catalog.

Requisition Responsibility

Specifies the party responsible for ordering the object. To change the options on the list, edit the **Requisition Responsibility** select list in Catalog.

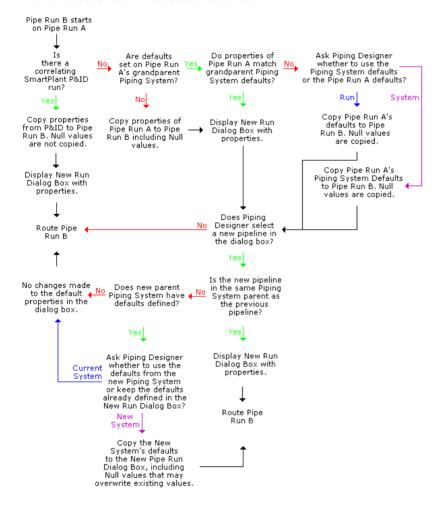
Supply Responsibility

Specifies the party responsible for delivering the object. To change the options on the list, edit the **Supply Responsibility** select list in Catalog.

Testing Responsibility

Specifies the party responsible for testing on the object. To change the options on the list, edit the **Testing Responsibility** select list in Catalog.

How the Software Evaluates Defaults



Defaults Tab (Route Pipe Settings Dialog Box)

The **Defaults** tab is only displayed when you are actively routing a pipe run and you click the **Properties** option on the ribbon bar.

Minimum Straight Length

Displays the minimum allowed length of straight pipe.

Straight Option

Select the option code associated with the pipe that you want to use while routing. Only those option codes defined in the controlling piping specification appear.

Turn Option

Select the option code associated with the turn component that you want to use while routing. Only those option codes defined in the controlling piping specification and shared by all of the short codes that can be placed automatically *while* routing appear. Only the options available for all short codes available during routing are listed. If the pipe spec writer only added a second choice for 90 deg direction change, then route would not display it in the drop down list.

Branch Type

Select the option code for the branch type that you want to use while routing.

Automatic Angle Lock On

Specifies if the Angle lock should automatically lock when you type a new angle value into the **Angle** box.

Bend Radius Multiplier

Specify the bend radius multiplier for bends. This overrides the default bend radius multiplier defined in the piping specification. This field is not available unless the **Pipe Bend Radius**By User Option is set to **Pipe Bend Radius** By User Is Enabled in the Catalog task. You can find the option in Catalog under the **Piping > Piping Specification > Model Options** node in the tree view.

Remember Working Plane

Allows you to choose whether the software remembers the last used working plane. **False** clears the last selected plane so that you must reset the plane each time that you begin routing. **True** remembers the last used working plane. The software then remembers your selection and locks each route onto the plane. The default option is **False.**

When **Remember Working Plane** is set to **False**, the default plane option for **Route Pipe** is **No Plane**. Each time that you click a routing command, the system clears the last selected **Plane** option. You must reset the plane option each time that you begin a route.

However, you can set the default behavior to remember the last used working plane by setting **Remember Working Plane** to **True**. The software then locks the route onto the plane that you are using and remembers your selection within that session only.

NOTE This option is available when you are routing duct, piping, cableways, and conduits. Setting this option to **True** when you are in any of these tasks results in an automatic **True** setting for all tasks. Likewise, setting this option to **False** when you are in any of these tasks results in an automatic **False** setting for all tasks.

Reference 3D Tab

Displays Reference 3D object properties. You can modify these properties as needed.

NOTE This tab is available only when you select a Reference 3D object.

Port ID

Displays the name of the Reference 3D object port.

Nominal Size

Specifies the nominal size of the port.

NPD Unit Type

Specifies the units for the NPD column. For example, type mm (millimeters) or in (inches).

Termination Class

Specifies the termination class for the nozzle.

Termination Sub Class

Specifies the termination sub-class for the nozzle.

End Preparation

Specifies the end preparation code for the part port. Select a valid code from the drop-down list.

End Practice

Specifies the end practice for the nozzle.

End Standard

Specifies the end standard code for the part port. Select a valid code from the drop-down list.

Rating Practice

Specifies the rating practice for the nozzle.

Pressure Rating

Specifies the pressure rating code for the part port. Select a valid code from the drop-down list.

Schedule Practice

Specifies the schedule practice for the nozzle.

Schedule Thickness

Specifies the schedule thickness short description or code for the part port. Select a valid code or short description from the drop-down list.

Set Offset Reference Dialog Box

Sets options for reference offsets.

Offset Reference Type

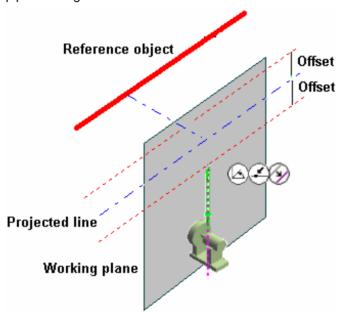
Select the offset type you want to use.

- **External** Route a pipe a specified distance from another object, such as another pipe running parallel to the one you are placing.
- Cardinal Point Route a pipe by the top, sides, bottom, or invert elevation of the pipe instead of the pipe centerline. You must use Tools > Pinpoint and lock the plane when using this reference type.

Include Insulation Thickness

Select this option to include the pipe's insulation thickness when calculating the cardinal point offset. Clear this option to have the cardinal point be the edge of the pipe and ignore the insulation thickness. This option is only available with **Offset Reference Type** is set to **Cardinal Point**.

If the referenced object is planar surface (such as a slab or deck) or a linear element (such as a structural beam), then the offset distance is measured from the surface or line to the selected reference plane (for example, the east/west plane (x-plane)) on which the pipe is being routed.



Offset

Type the distance that you want to offset. You can turn off the offset option by selecting **<Disabled>**.

Measured From

Select the object from which you want to measure the offset. You can select from:

- Centerline Select this option if you want to measure the offset from the centerline of a pipe run.
- Pipe Surface Select this option if you want to measure the offset from the outside surface of a pipe run.
- Insulation Surface Select this option if you want to measure from the outside insulation surface.
- Largest Surface Select this option if you want to measure from the object that has the
 greatest diameter on the pipe run. The object could be the pipe surface, insulation
 surface, a flange, a valve, or any other pipe part.
- Staggered Select this option to measure from the largest object on the pipe that you
 are routing to the largest surface on the pipe that you are referencing. Use this option
 when you want to get pipe centerlines as close as possible by staggering the location of
 split flanges.

See Also

Route a Pipe Run with an Offset (on page 74)

Specify Component Tag Dialog Box

Allows you to specify the component that you want to use by the component tag. You activate this dialog box by selecting the **Insert Component** command, and then selecting **<Specify Component Tag>** from the **Type** option.

Source for Tags

Specifies the location of component tags in the Component Tag drop down list.

- Catalog Select this option to show components in the Catalog.
- Design Basis Select this option to show components in the referenced Design Basis.

Honor Specification

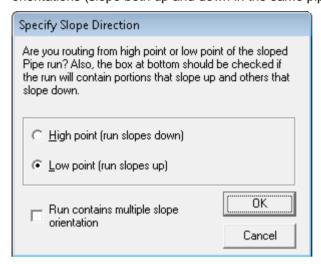
Select this option to show components that are only valid for the piping material class that the selected pipe is assigned.

Component tag

Displays a list of available tag numbers of components based on the pipe geometry and, if applicable, the pipe specification and schedule, at the insertion location. Select the tag of the component that you want to insert. You can also specify the name of an instrument that was retrieved from SmartPlant P&ID or SmartPlant Instrumentation.

Specify Slope Direction Dialog Box

Defines the slope direction of a new pipe run and whether the pipe run can have multiple slope orientations (slope both up and down in the same pipe run).



High Point

Select this option to indicate that the pipe run end point that you just identified is the highest point on the pipe run.

Low Point

Select this option to indicate that the pipe run end point that you just identified is the lowest point on the pipe run.

Run contains multiple slope orientation

Indicates that the pipe run will slope both up and down. After you specify that a pipe run has multiple slope orientations, you cannot clear the selection.

CAUTION You should only route pipe runs with multiple slope orientations when it is absolutely required.

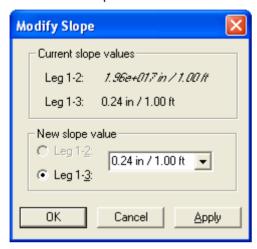
See Also

Route a Multi-Sloped Pipe Run (on page 72) Route a Sloped Pipe Run (on page 70)

Modify Slope Dialog Box

Modifies the slope of a pipe feature that is connected to a turn. You can modify the slope of only one leg at a time. You must select a turn feature, and then select the **Modify Slope** option on the ribbon to activate this dialog box.

NOTE To modify the slope of a pipe run, delete the pipe run and create a new pipe run with the modified slope value.



Current Slope Values

Displays the current slope for each leg connected to the turn. Legs with an invalid slope display in *italics*.

New Slope Value

Select the leg for which you want to modify the slope, and then select a new slope. The leg that you are editing highlights in the model. If you are trying to model a small slope but cannot get the software to model it, you might be hitting the minimum slope setting in the registry. Contact Intergraph Support for assistance in editing the setting.

Select Pipe Run Dialog Box

Displays the pipe runs so you can select the pipe run you want.

■ NOTE Look In options are currently only available for **Quick Route →**.

Look In

Specifies where you want to look for the pipe run.

- Workspace Displays all pipe runs placed in the defined workspace only.
- Database Displays all of the pipe runs available in the entire model database.

See Also

Route Pipe (on page 50) Quick Route (on page 186) Pipe Run Properties Dialog Box (on page 287)

Select System Dialog Box

This dialog box displays all of the defined pipeline systems so that you can select the pipeline system that you want.

Look in

Specify where you want to look for the pipeline system. Select **Workspace** to look for the pipeline system in your defined workspace only. Select **Database** to look for the pipeline system in the entire model database.

Insulation Specification Dialog Box

Displays the available insulation specifications for the active piping system. Select the insulation specification that you want to use, and then click **OK**.



NOTE You can modify the list of available insulation specification by switching to the Systems and Specifications task, selecting the piping system or pipeline system that you want to modify, and then selecting the **Allowed Specifications** command on the ribbon bar.

SECTION 4

Route Selection Commands

Route selection commands allow you to select part of a route network to modify. Use the **Get Features** commands to select a section of a route network using one or more features on that network. The **Get Connected Supports** command allows you to select connected supports of a feature. To select only the runs in a route network, select one or more associated features to the runs and use the **Get Runs** command.

These commands simplify the selection of a specific section of the piping network. For example, if you want to modify a pipe leg along with its supports, select the pipe leg using **On Same Leg**, and add the hangers supporting the pipe leg using **Get Connected Supports**.

★ IMPORTANT

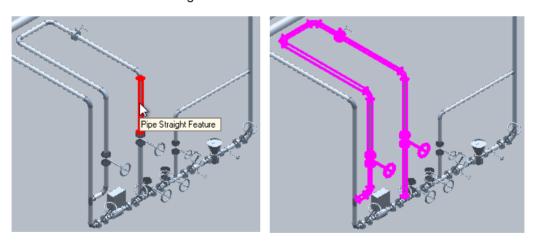
- You must select Piping Features in the Locate Filter.
- Get Features commands do not support combined features that belong to different tasks.
 For example, you cannot combine Piping and HVAC features, or Electrical and HVAC features.

Get Features Commands

Contains a group of commands that allow you to select a section of the targeted route network. The **Get Features** commands apply to features that are in the select set and are defined in the Workspace. You can select one or more features on the network. You can also combine the following commands to extend the targeted network as necessary.

On Same Run

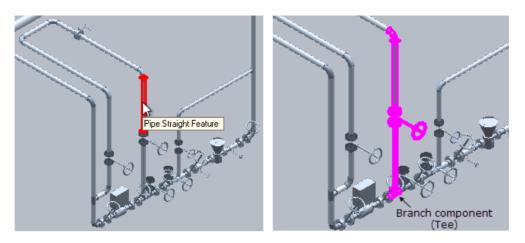
Selects all features that belong to a same run even if the run is discontinued.



On Same Leg

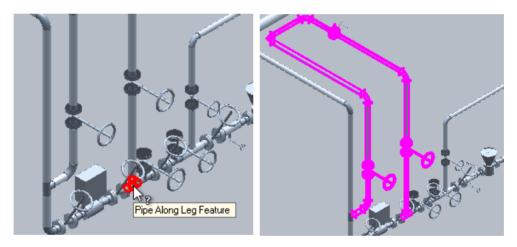
Selects all features that belong to the same leg. The software also includes the along-leg feature if the selected leg is a branch.

NOTE A leg is a group of route features routed in the same direction.



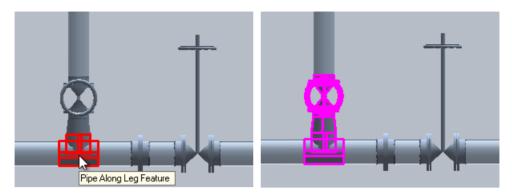
On All Connected Branches

Selects all features associated with the connected branches. Select an along-leg feature that has a branch connected. Right-click, and select **On All Connected Branches.** The software selects the associated features connected to the branch run until it branches into a header run, or until a free end is traversed.



For Connected Fittings

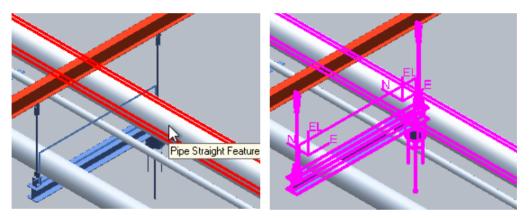
Adds the immediate connected fittings to the selection. You must select a branch component.



TIP You can select a leg using **On Same Leg**, and then use **For Connected Fittings** to add all the adjacent branch fittings on that leg to the selection.

Get Connected Supports

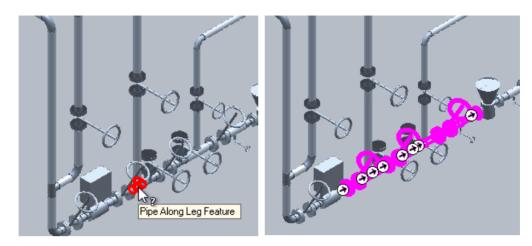
Selects all supports connected to the selected feature.



NOTE This command does not support duct banks and cable tray barriers. However, you can select a barrier in a cable tray, or a conduit in a duct bank.

Get Runs

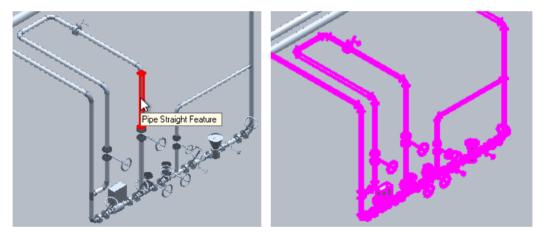
Selects only the runs associated with the selected feature.



NOTE This command does not support duct banks and cable tray barriers. However, you can select a barrier in a cable tray, or a conduit in a duct bank.

Get Continuously Connected

Selects the feature and all features that are continuously connected to that feature.



★ IMPORTANT Use this command to select a disconnected section of piping network. If it is a large network, as there will be thousands of features, the selection takes more time.

See Also

Move a set of pipe features (on page 110) Connect pipe runs using Move (on page 113)

SECTION 5

Move Pipe Objects

You can move route objects by selecting one or more features using **Move** on the main ribbon bar, or using the **Move From** and **Move To** commands on the modify feature ribbon bar. We recommend that you use **Move** to move large sections of network to maintain the connectivity. Use **Move From** and **Move To** to move a feature.

You can only move a route object if:

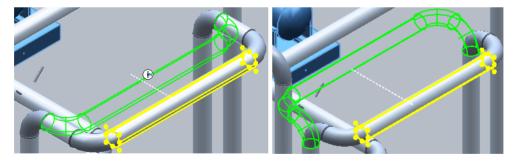
- you have Full Control or Write access to the permission group the object belongs to,
- the object's Approval Status is Working.

By moving the piping features, you can alter the route of the pipe, connection points, or component placement. You can also precisely locate each feature in the layout of your piping systems.

You can move the following features:

Straight Features

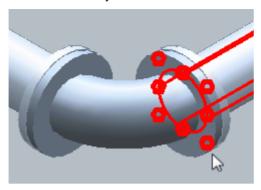
- Moving a straight feature moves the entire leg to which the feature is connected.
- The move direction is always perpendicular to the axis of the straight feature.
- A branch feature connected to the moved leg maintains its original angle.
- Movement stops when parts on the associated leg overlap, or when the parts overlap with adjacent parts on connected legs.
- Moving a constrained leg beyond the fitting-to-fitting connection, results in a horizontal flip, as shown in the graphic.



 As long as the end of the leg connected to the equipment nozzle is in the same plane as the turn or branch, the leg moves and shrinks—if the logically connected end feature is not overlapping another feature on the leg.

To move straight features, select one of the orientation handles that the software displays at the ends of the straight feature. This is the move-from point. The orientation handles allow you to move the pipe in relation to the edge of the pipe instead of the pipe centerline. For example, use the orientation handles to align the bottom of pipe with the top of a beam. The selectability of the orientation handles is controlled by the **Key point** option on the **Tools > Options >**

SmartSketch3D tab. Unless you need orientation handles, we recommend that you keep them turned off as they can sometimes interfere with selecting the pipe end feature.



Turn Features

- If you move a turn to a position where the two adjacent legs are collinear (that is, the turn reaches 180 degrees), the software deletes the turn.
- The turn stops moving when it starts to overlap with an adjacent along-leg feature.
- If neither angle 2 or 3 is locked, the move is along the bisector. If either angle 2 or 3 is locked, the move is along the other leg.

End Features

- Moving the end feature changes the length of the straight feature.
- Moving the end feature changes the topology of the turn feature or the branch feature if it is connected to another leg. The default motion plane is the connected turn feature or along leg feature.
- You cannot move an end feature connected to a nozzle.
- You cannot move the end feature past the point where the straight feature length becomes zero, such as the point where an end feature touches a nozzle or a free port of another feature.
- For non-branching situations, if you move or paste an end feature within ¼ inch (6.35 mm) of another end feature, the software automatically connects the two end features. This automatic connection works for both flange and butt-weld connections. Please note that the software will lengthen or shorten the pipe length to make the connection.

Branch Features

- If the branch and header are in the motion plane, the branch feature moves along the branch leg.
- If the branch and header are not in the motion plane, the end of the branch leg and the branch feature move to keep the branch angle constant.
- You can move the branch feature along the associated straight feature. As you move the feature, the software displays the angle between the branch feature and the branch leg.

Along Leg Features

- You can move along leg features along the pipe on which you placed them. The software prevents you from moving the along-leg feature past the end of the pipe or to a position that would cause parts to overlap.
- Along-leg features that are not branches, such as valves and flanges, maintain a position at a constant distance from the fixed end of the leg.
- If along-leg features such as a flange or an elbow are located at an open end of the pipe, you can move them using **Move**. You do not need to select the end feature to move.

NOTE You can move features only after you finish routing a pipe run and placing components. Modify commands are not available until you complete routing or placement. You can complete a feature move by right-clicking or by pressing **Esc**.

Tagged Components

The software does not replace components with a TAG when re-computing a run after a move operation. Components such as elbows and tees should not have a TAG because it prevents the software from replacing them when needed during the re-compute.

Boundary Connections

When you move pipe runs at boundary connections, the software modifies the associated piping network. For more information, see *Appendix: Moving at Boundary Connections* (on page 234).

What do you want to do?

- Move a pipe run (on page 106)
- Move a branch (on page 107)
- Move a sockolet, weldolet, or latrolet (on page 112)
- Move a pipe end (on page 109)
- Move a straight pipe (on page 109)
- Move a turn (on page 110)
- Move a set of pipe features (on page 110)
- Connect pipe runs using Move (on page 113)

Move a pipe run

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Runs in the Locate Filter.
- 3. Select the pipe run to move.
- 4. Select **Move** $ext{$\oplus$}$ on the main ribbon.
- 5. Select a motion plane on the ribbon.
- 6. Select a location either on the pipe run or in the model to use as the move-from location.

- TIP If you move the pipe end within ¼ inch (6.35 mm) of another pipe end, the software automatically connects the two ends. Please note that the software will lengthen or shorten the pipe length as needed to make the connection.
- 7. Identify the move-to point, and click on the graphic view to confirm the new location.

 The software moves the pipe run to the new location.

NOTE For more information on how the software performs the move operation, refer *Appendix: Moving at Boundary Connections* (on page 234).

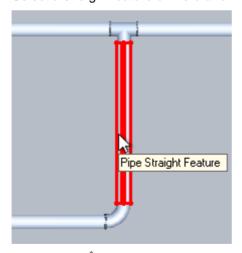
Move a branch

★IMPORTANT

- You must have write access permissions on the header run. If you do not, the branch and header runs get disconnected when you move the branch.
- You must select a straight feature or an along leg feature to move the branch along the header without disconnection. If you select a turn, an end component such as the Y-component, or an end feature, the software disconnects the branch run from the header run.
- If you select Pipe Runs in the Locate Filter, the software disconnects the branch run and the header run at the branching point. For more information on how the software disconnects at the boundary connections, refer Appendix: Moving at Boundary Connections (on page 234).

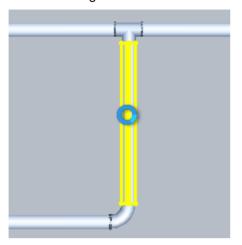
Slide a Branch along the Header

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select a straight feature of the branch run.

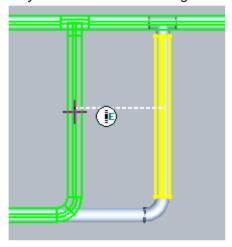


Click Move *.

5. Click the straight feature.

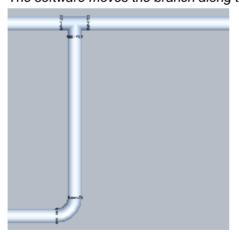


As you move the mouse along the header, the compute graphics follow the mouse cursor.



6. Identify the move to point, and click on the graphic view to confirm the new location.

The software moves the branch along the header to the new location.



Move a pipe end

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the pipe end that you want to move.
 - TIP Make sure you select the pipe end and not the pipe itself.
- 4. Click **Move To** \nearrow on the ribbon.
- 5. Identify the new location for the pipe end.

■ NOTES

- You can use the **Length** box to type a new length for the pipe. The software moves the pipe end to the specified length.
- If there is an elbow at the other end of the pipe, use the **Angle** box to specify a turn angle for the elbow. The software orients the pipe to the specified angle.
- If you move a pipe end within ¼ inch (6.35 mm) of another pipe end, the software automatically connects to two ends. Please note that the software will lengthen or shorten the pipe length as needed to make the connection.

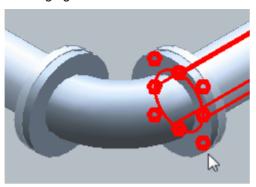
Move a straight pipe

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the pipe feature that you want to move.
- 4. Set the **Length Lock** A as needed.
- 5. Select Move To 3.
- 6. Identify the new location for the pipe.

NOTES

- When you move a straight feature, such as a pipe, the default working plane is the plane of one of the adjacent turns. The software selects the turn first by the plane that includes branches, and then by the plane of larger nominal diameter.
- You can select one of the orientation handles that appear at the ends of the straight feature as your move from point. These orientation handles allow you to move the pipe in relation to the edge of the pipe instead of the pipe centerline.

For example, you can use the orientation handles to align the bottom of pipe with the top of a beam. The display of the orientation handles is controlled by the **Key point** option on the **Tools > Options > SmartSketch3D** tab. Unless you need them, we recommend that you keep the orientation handles turned off as they can make selecting the end feature of a pipe challenging.



 For more information on how the software performs the move operation, refer Appendix: Moving at Boundary Connections (on page 234).

Move a turn

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the turn that you want to move.
- 4. Click Move To 3.
- 5. Identify the new location of the turn.
- **NOTE** You can use the **Angle** box to type a new angle for the turn. The software moves the turn along the pipe to the specified angle.

Move a set of pipe features

- 1. Click **Select** on the vertical toolbar.
- 2. In the Locate Filter, select Piping Features.
- 3. Select a feature on the piping section to move.
- Right-click the feature, and select an option under Get Features. For more information, see Route Selection Commands
- 5. Click **Move** $ext{$\phi$}$ on the main ribbon.
 - TIP If you move the pipe end within ¼ inch (6.35 mm) of another pipe end, the software automatically connects the two ends.
- 6. Select a move-from point.
- 7. Identify the move-to point, and click the graphic view to confirm the new location.

The software moves the pipe run to the new location.

NOTE For more information on how the software performs the move operation, see *Appendix: Moving at Boundary Connections* (on page 234).

Connect a Set of Pipe Features

- 1. Click **Select** on the vertical toolbar.
- 2. In the Locate Filter, select Piping Features.
- 3. Select a feature in the piping section to modify.
- 4. Right-click the feature, and select an option under **Get Features**. For more information, see *Route Selection Commands* (on page 100).
- 5. Click **Move** * on the main ribbon.
- 6. Click an end feature in the selection.
- 7. To connect the selection to another pipe inline, click an open end feature of the pipe.

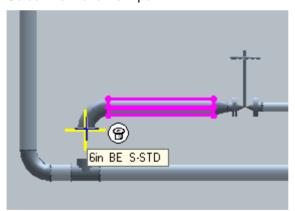
-OR-

To connect the selection to another pipe at a branch point, click a straight feature of the pipe.

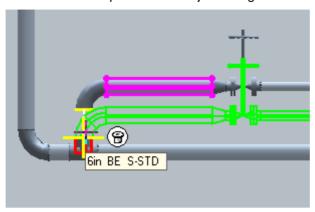
NOTE The software will lengthen or shorten the pipe as needed to make the connection. For more information, see *Connecting pipe runs using Move* (on page 234).

Connect a Pipe Leg

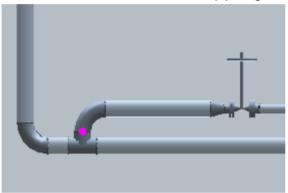
- ★ IMPORTANT Make sure that the Locate Filter is set to Piping Features.
- 1. Select a straight feature on the pipe leg to connect.
- 2. Click **Move** � on the main ribbon.
- 3. Select the move-from point.



4. Select a move-to point on the adjacent leg to connect.



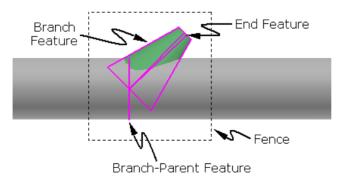
The software connects the selected pipe leg to the adjacent leg.



■ NOTE You can also use this procedure to connect pipes ending with an along-leg feature, such as a flange. For more information, see *Connecting pipe runs using Move* (on page 234).

Move a sockolet, weldolet, or latrolet

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Drag a fence around the branch-parent feature (on the header leg), the olet, and the end-feature at the free end of the olet.



4. Select either **Route Multi-Move** or the **Move** command and move the selected olet to the new location on the header.

Connect pipe runs using Move

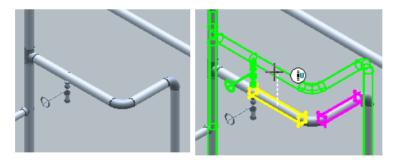
- 1. Click **Select** on the vertical toolbar.
- 2. In the Locate Filter, select Piping Features.
- 3. Select the pipe run to move.
- 4. Select **Move** $ext{$\phi$}$ on the main ribbon.
- 5. Click the (move-from point) pipe end feature.
 - TIP If you move the pipe end within ¼ inch (6.35 mm) of another pipe end, the software automatically connects the two ends. Please note that the software will lengthen or shorten the pipe as needed to make the connection.
- 6. Click the other pipe end feature (move-to point).

 The software moves the pipe run and connects it to selected pipe run.

NOTE For more information on how the software connects two pipe runs, see *Connecting* pipe runs using Move (on page 234).

Best Practices - Moving Pipe Objects

- To move large pipe sections and maintain the connectivity, we recommend that you use **Move** ♣.
- To move a single feature, use **Move From** → and **Move To** ✓ on the modify ribbon bar.
- To select a set of features, a pipe leg, or pipe runs in a small piping section use the Route Selection Commands (on page 100).
- To move a constrained branch along the header, select the two adjacent straight features as shown in the following example:



Moving Pipe Legs using PinPoint with Relative Placement

- 1. Select a straight feature on the pipe run.
- 2. Activate Relative Tracking 🏂.
 - a. Click **PinPoint** $\stackrel{x,y}{\oplus}$ (plant) or $\stackrel{E,N}{\oplus}$ (ship).

- b. Click Relative Tracking 🏂.
- 3. Select a straight feature on the selection to specify the start point.
- 4. Click Move .
- 5. Select Lock PinPoint.
- 6. Click Move From .

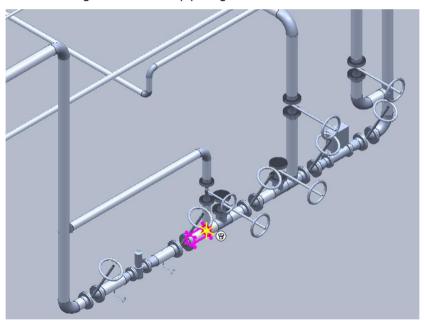
The software locks the coordinates at the selected reference point.

- 7. Specify the required coordinates based on the move direction.
- 8. Click **Move To** A, and then click anywhere in the Graphic View.
- 9. Specify the new coordinates of the pipe leg, and press ENTER. The pipe leg moves to the specified coordinates.

TIP At step 8, you can unlock one of the coordinates and use **Step** on the PinPoint ribbon to round off the distance, or use the SmartSketch3D constraint to align the destination point with the starting point.

Move Pipe Legs with Connected Branches

1. Select a straight feature on a pipe leg.



2. Click Move To 3.



3. Move the pipe leg to its new location and click to lock the pipe leg in place.

The connected pipe branches oriented on the same plane of movement as the pipe leg will change their lengths accordingly.

NOTES

- This procedure also works for horizontal loops.
- If the header run has an open branch such as a drain or vent, the software automatically moves the branch along with the header run maintaining the connectivity.
- Some branches, such as olets, have constrained measurements, which can constrain the pipe leg movement.

SECTION 6

Editing Properties

All objects that compose a pipeline have properties that you can edit. Using the **Select** command on the vertical toolbar, you select the pipeline object that you want to edit.



An important part of the **Select** command is the **Locate Filter** box that appears on the ribbon. The **Locate Filter** box contains the available, pre-defined filters for the **Select** command. When you choose a filter in the **Locate Filter** box, the software allows you to select only the filtered objects in the graphic view and in the **Workspace Explorer**. For example, if you select **Pipe Runs**, you can select only pipe runs in the graphic view or in the **Workspace Explorer**.

The Piping task includes these filters:

Clamps

Allows you to select only clamps in the graphic view or in the Workspace Explorer.

Connections

Allows you to select only connections in the graphic view. The software creates a connection whenever a piping component is connected to another component, an equipment nozzle, or a pipe.

Construction Graphics

Limits the selection of items to construction graphics.

Equipment

Allows you to select only equipment in a graphic view or in the Workspace Explorer.

Penetration Spools

Allows you to select only penetration spools. Before you can create penetration spools, you must place a penetration plate in the Hangers and Supports task.

Pipelines

Allows you to select only pipelines in a graphic view or in the **Workspace Explorer**.

Piping Features

Limits the selection of objects to only pipe features. Some examples of features are straight features, such as pipe, and in-line component features, such as valves.

Piping Nozzle

Allows you to select only pipe nozzles in a graphic view or in the **Workspace Explorer**.

Piping Parts

Allows you to select in a graphic view or in the **Workspace Explorer**, only the individual pipe parts that are associated with a feature. For example, a valve feature might have

several parts: the valve body and the flanges.

Piping Runs

Allows you to select only pipe runs in a graphic view or in the **Workspace Explorer**.

Spools

Allows you to select only spools in a graphic view or on the **Assembly** tab in the **Workspace Explorer**. You can break pipelines into spools using the **Generate Spools** command.

Taps

Allows you to select only taps in a graphic view or in the **Workspace Explorer**.

Welds

Allows you to select only welds in the graphic view or in the **Workspace Explorer**.

ΑII

Allows you to select any object, even objects created in another task.

More

Displays the **Select Filter** dialog box. The **Select Filter** dialog box displays all of the simple filters that are set up to accept object type or system objects as discrimination data. You can then select additional filters to add them to this list. Only the selection of filters is available; all other options are disabled.

Use the **Inside** fence command to select all objects entirely inside the fence.

Use the **Inside/Overlapping** fence command to select all objects entirely inside the fence and those objects outside but touching the fence at some point.

Associating Features with a New Run

When you select multiple features and associate them with a new run by selecting **<New Pipe** Run> from the Run list, the Create New Run dialog box is populated with all of the properties belonging to the run associated with the selected features. If the existing run's properties do not match the defaults specified in the system, a dialog box displays asking you whether you want to retrieve these properties from the **System**, the Run, or **None**.

■ NOTES

- If the initial set of features belongs to more than one run, the software checks if all of the selected features belong to the same system. If they do, a dialog box displays asking if you want to retrieve the properties from the **System** or **None**.
- If the features belong to different systems, the software displays the following message:
 - Selected features do not have common default run properties. Please review the run properties to ensure they meet requirements.
- If the selected features are not contiguous, the software displays the following message:
 - Features being assigned to target run are not contiguous. Do you want to proceed with this operation?
- This functionality works the same if you select an individual feature.

What do you want to do?

- Edit pipeline properties (on page 118)
- Edit pipe run properties (on page 118)
- Edit branch properties (on page 118)
- Edit straight pipe properties (on page 119)
- Edit turn feature properties (on page 119)
- Edit part properties (on page 119)

Edit pipeline properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Pipeline in the Locate Filter box.
- 3. Select the pipeline to edit.
- 4. Click Edit > Properties.

Edit pipe run properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Runs in the Locate Filter box.
- 3. Select the pipe run to edit.
- 4. Click Edit > Properties.

■ NOTES

- You can edit the flow direction of the pipe run by clicking the flow direction indicator on the pipe run and then selecting the new direction.
- You also can click Properties on the ribbon to edit properties.

Edit branch properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter box.
- 3. Select the branch, such as a tee, to edit.
- 4. Click Edit > Properties.
- 5. Edit the branch properties.
- **NOTE** You also can click **Properties** on the ribbon to edit branch properties.

Edit straight pipe properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select **Piping Features** in the **Locate Filter** box.
- 3. Select the straight pipe to edit.
- 4. Click Edit > Properties.
- **NOTE** You also can click **Properties** an on the ribbon to edit properties.

Edit turn feature properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter box.
- 3. Select the turn to edit.
- 4. Click Edit > Properties.
- **NOTE** You also can click **Properties** on the ribbon to edit properties.

Edit part properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Parts in the Locate Filter.
- 3. Select the part, such as a flange, to edit.
- 4. Click Edit > Properties.

SECTION 7

Deleting Pipe Objects

You can delete route objects to remove unwanted objects. You cannot delete parts directly. When you delete any route object, the software attempts to maintain the design integrity of the model by deleting connections, mating parts, and adjusting all previously connected features.

★ IMPORTANT

- You cannot delete a route object in non-working approval status, such as Approved, In Review, and Rejected.
- You can delete a route object only if it is in working state. In a Global Workshare Configuration, if you delete an object at your location that is connected to an object at a different location, the software generates a To Do Record to delete connections. You must have Write access to update the To Do Record.
- When you delete a route object, its associated system generated parts such as mating flanges or reducers in working state are also deleted. If you delete a non-working system generated part, the software generates a To Do Record for that part and the part remains.

Pipelines

- Deleting a pipeline deletes all pipe runs, features, and parts associated with that pipeline.
- The pipeline is cut at all boundaries and creates gaps. The software neither extends nor inserts a straight feature.

Pipe Runs

- Deleting the run deletes all features (and thereby all parts) belonging to the run.
- The Piping task cuts the pipe run legs at all boundaries and creates gaps. The software neither extends nor inserts a straight feature.

Straight Features

- Deleting a straight feature does not remove the connected turn features.
- Deleting a straight feature also does not delete any adjacent branch features if the straight feature is connected to the branch port of the feature. For tee-type branches, the system leaves the tee in place. Branching valves, instruments and piping specialties will not be deleted in either of these cases mentioned above.
- Deletion of a straight feature adjacent to a split feature removes the split feature if no other part is connected to the split feature.
- Deletion of a straight feature adjacent to a run change feature removes the run change feature.
- If the straight feature connects to a component, the software does not delete the component when the straight feature is deleted. However, any mating parts generated to facilitate connection to the component are deleted.

Turn Features

- Deleting a turn feature extends the connecting straight features to the turn point.
- Deleting a turn feature removes all adjacent run change features and mating parts.
- When a branch feature is adjacent to the turn feature, the software inserts a straight feature to avoid deleting a branch.

Inline Components or Split Features

• If an inline component or split feature is deleted, the software deletes all mating parts. The two connected straight features merge, forming one straight feature, provided they share the same parent pipe run and the same nominal piping diameter (NPD).

Boundary Connections

When you delete pipe runs at boundary connections, the software deletes all associated boundary connections with few exceptions related to permission groups, approval status and Global Workshare configuration. For more information, see *Appendix: Deleting at Boundary Connections* (on page 246).

What do you want to do?

- Delete a branch (on page 121)
- Delete a straight pipe (on page 121)
- Delete a component (on page 122)
- Delete a split (on page 122)
- Delete a turn (on page 122)
- Delete a pipe run (on page 122)
- Delete a pipeline (on page 123)

Delete a branch

- 1. Click **Select** on the vertical toolbar.
- 2. In the Locate Filter, select Piping Features.
- 3. Select the branch to delete.
 - TIP You can also use the Get Features Commands to select the branch.
- 4. Click **Delete** X.

■ NOTE For more information on how the software performs the delete operation, refer *Appendix: Deleting at Boundary Connections* (on page 246).

Delete a straight pipe

1. Click **Select** on the vertical toolbar.

- 2. In the Locate Filter, select Piping Features.
- 3. Select the straight feature to delete.
- 4. Click **Delete** X.

NOTE For more information on how the software performs the delete operation, refer *Appendix: Deleting at Boundary Connections* (on page 246).

Delete a component

- 1. Click **Select** on the vertical toolbar.
- 2. In the Locate Filter, select Piping Features.
- 3. Select the component, such as a valve, to delete.
- 4. Click Delete X.

NOTE The software automatically deletes all mating components (flanges and gaskets, for example) that were placed with the component that you deleted.

Delete a split

- 1. Click Select &.
- 2. In the Locate Filter, select Piping Features.
- 3. Select the split or takedown joint to delete.
- 4. Click **Delete** X.

Delete a turn

- 1. Click **Select** on the vertical toolbar.
- 2. In the Locate Filter, select Piping Features.
- 3. Select the turn to delete.
- 4. Click **Delete** X.

Delete a pipe run

- 1. Click **Select** on the vertical toolbar.
- 2. In the Locate Filter, select Piping Features.
- 3. Select the pipe run to delete.
 - TIP You can also use the Get Features Commands to select the pipe runs.
- 4. Click **Delete** X.

NOTE For more information on how the software performs the delete operation, refer *Appendix: Deleting at Boundary Connections* (on page 246).

Delete a pipeline

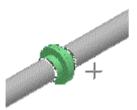
- 1. Click **Select** on the vertical toolbar.
- 2. In the Locate Filter, select Pipelines.
- 3. Select the pipeline to delete.
- 4. Click Delete X.

NOTE For more information on how the software performs the delete operation, refer *Appendix: Deleting at Boundary Connections* (on page 246).

SECTION 8

Insert Split

Divides the pipe into sections. You can use any split feature defined in the reference data, such as a flange or a butt weld, to connect the two resulting pipes.



You can select this command while routing pipe, or select it after routing pipe to insert a split in an existing pipe. If you select the **Insert Split** command and then select an existing pipe, you have two options:

- You can have the software cut the pipe feature into two features that represent two pipe parts joined by a weld joint or a takedown joint.
- You can have the software cut the pipe feature into two features that represent a single pipe part using a feature break. When splitting using a feature break, no weld or connection is placed so the two-features combined represent a single pipe part. By using a feature break, you can stop heat-tracing, insulation, or a surface coating at an arbitrary location along the pipe instead of at a weld or other break in the line.

You also have the option to place flange and butt weld splits in single-placement or multi-placement mode. In multi-placement mode, you can select either pipe runs or straight features and specify the distance between the splits. The default distance is the purchased pipe length defined in the piping specification.

When you insert a takedown joint, the software automatically selects and positions the necessary parts based on the split feature information in the pipe specification defined for the pipe run. If you select a sleeved weld joint, the software automatically selects and positions the sleeve. The software uses the reference data that defines specific parts for standard splits. The allowed parts are generally a very restricted subset of the parts (flanges and sleeves) that are allowed for general placement by the specification.

You can select an existing split and edit any part of the split feature definition by clicking the appropriate ribbon control.

■ NOTE Special takedown joints not covered by the pipe specification split rules can be manually created by inserting flange components using the **Insert Component** command. When you place a flange manually as a component, the software automatically cuts the pipe and inserts the appropriate mating part for the flange.

Insert Split Ribbon

Sets options for inserting splits into a pipe run.

Pipe Split Feature Properties

Opens the **Pipe Split Feature Properties** dialog box in which you can define additional properties that are not available on the ribbon bar. For more information, see *Pipe Split Feature Properties Dialog Box* (on page 129).

Select Feature

Selects the pipe in which you want to insert a split.

A Enter Insertion Point

Defines the location to insert the split.

Run

Displays the name of the pipe run to which the split belongs along with the names of all other runs associated with the same pipeline parent. You can select another pipe run if needed. You can select **More** to select a pipe run that is associated with a different pipeline parent.

■ Weld Joint

Select this option when a welded joint is necessary.

Takedown Joint

Select this option when a takedown joint is necessary.

Feature Break

Select this option to place a feature break. Feature breaks are used to stop heat-tracing, insulation, and coatings at arbitrary locations along a pipe without having to break the pipe into two pipe parts.

Type

Select the type of split component to place. The software generates this list based on the components allowed by the pipe specification for the selected pipe. You can also specify the component that you want to use by selecting **Specify Component Tag** and then entering the component tag. See *Pipe Specifications* in *Piping Reference Data Guide* for more information on defining pipe specifications.

Option

Displays the option of the selected split component. In addition, the **Option** list contains any options defined in the pipe specification for the short code selected in the **Type** list. Select another value from the **Option** list to update the object.

Finish

Places the splits using the parameters that you have specified.

Split Mode

Specifies whether to place a single split or multiple splits. Select **Single Split** to place a single split or feature break at a specified location. Select **Multi Split** to place splits on straight features at a specified distance apart. You can select a single straight feature or an entire run in this mode. If you select an entire run, the splits are placed at the specified distance apart on each individual straight feature in the run, but not across the entire run itself. The **Multi Split** option will not place splits on bent pipe. Splits placed using the **Multi Split** option have no relation to each other after placement. Feature breaks cannot be placed in the **Multi Split** mode.

Pipe Length

Specifies the distance between the splits. The default distance is the purchased pipe length defined in the piping specification. This option is only available when **Split Mode** is set to **Multi Split**.

Reference

Select **Start** to measure the distance from the start end (the first end that was placed) of the pipe. Select **End** to measure from the end of the pipe. This option is only available when **Split Mode** is set to **Multi Split**.

Modify Split Feature Ribbon

Displays options for modifying a split in a pipe.

Properties

Activates the properties dialog box. For more information, see *Pipe Split Feature Properties Dialog Box* (on page 129).

Move From

Click to identify the origin of the move vector. If you do not define a starting point, the software assumes the current location of the split is the starting point.

Move To

Click to identify the termination point of the move vector.

Run

Displays the name of the pipe run or runs that are adjacent to the selected split feature. If two different runs are listed, you can specify either run as the owner of the split.

■ Weld Joint

Select this option to change the split to a welded joint.

Takedown Joint

Select this option to change the split to a takedown joint.

Type

Select the type of split. The software generates this list based on those components allowed by the pipe specification for the selected pipe.

Option

Displays the option of the selected **Type**. Additionally, the **Option** list contains any options defined in the piping specification for the short code selected in the **Type** list. For example, if two different rating are available in the piping specification for a flange short code selected in the **Type** list, both options appear in this list. Selecting another value from the **Option** list updates the object accordingly.

What do you want to do?

- Insert a welded split (on page 127)
- Insert a takedown joint (on page 127)
- Insert multiple splits a specified distance apart (on page 127)

- Insert a feature break (on page 128)
- Edit split properties (on page 128)
- Edit weld properties (on page 128)
- Move a split (on page 129)
- Move a feature break (on page 129)

Insert a welded split

- 1. Click Insert Split ... on the vertical toolbar.
- 2. For the Split Mode, select Single Split.
- 3. Select the pipe to split.
- 4. Click **Weld Joint** on the ribbon.
- 5. Select the type and option for the split in the **Type** and **Option** boxes.
- 6. Click to define the position of the welded split.

■ NOTE You can use the Tools > Pinpoint and Tools > Point Along commands to locate more precisely the position of the split.

Insert a takedown joint

- 1. Click Insert Split ... on the vertical toolbar.
- 2. For the Split Mode, select Single Split.
- 3. Select the pipe to split.
- 4. Click **Takedown •** on the ribbon.
- 5. Select the type and option for the split in the **Type** and **Option** boxes.
- 6. Click to define the position of the split.

■ NOTE You can use the Tools > Pinpoint and Tools > Point Along commands to locate more precisely the position of the split.

Insert multiple splits a specified distance apart

- 1. Click Insert Split is on the vertical toolbar.
- 2. For the Split Mode, select Multi Split.
- 3. Select the straight pipe or pipe run to split.
- 4. Click **Takedown** or **Weld** on the ribbon.
- 5. Select the type and option for the split in the **Type** and **Option** boxes.
- 6. In the **Pipe Length** box, specify the distance between the splits. The default distance is the defined purchased pipe length in the piping specification to which the pipe run (or straight pipe) belongs.

- 7. In the **Reference** box, select whether to measure the distance starting from the start of the pipe run or the end of the pipe run.
- 8. Click Finish.

■ NOTES

- Other than performing an immediate Undo, the multiple splits have no relationships between them after placement.
- You cannot place feature-break splits while in multi-split mode.

Insert a feature break

- 2. For the Split Mode, select Single Split.
- 3. Click Feature Break on the ribbon.
- 4. Select the pipe feature to break.
- 5. Click to define the position of the feature break.

■ NOTES

- You can use the Tools > Pinpoint and Tools > Point Along commands to locate more precisely the position of the feature break.
- When splitting using a feature break, no weld or connection is placed so the two- features combined represent a single pipe part. By using a feature break, you can stop heat-tracing, insulation, or a surface coating at an arbitrary location along the pipe instead of at a weld or other break in the line.

Edit split properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter box.
- 3. Select the split to edit.
- 4. Click Edit > Properties.
- NOTE You also can click **Properties** 🖆 on the ribbon to edit properties.

Edit weld properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Welds in the Locate Filter box.
- 3. Select the weld to edit from the **Workspace Explorer** or in the model.
- 4. Click Edit > Properties.

Move a split

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the split or takedown joint to move.
- 4. Click **Move From** A to identify the origin of the move vector. If you do not define a starting point, the software assumes the current location of the split is the starting point.
- Click Move To A.
- 6. Move the split to a new location.

NOTE You can use the **Tools > Point Along** and **Tools > Pinpoint** commands to help locate the split more precisely.

Move a feature break

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the feature break to move.
- 5. Click **Move From** A to identify the origin of the move vector. If you do not define a starting point, the software assumes the current location of the feature break is the starting point.
- 6. Click Move To 7.
- 7. Move the feature break to a new location.

NOTE You can use the **Tools > Point Along** and **Tools > Pinpoint** commands to help locate the feature break more precisely.

Pipe Split Feature Properties Dialog Box

Displays split feature properties for review and editing.

Edit Split Properties (on page 128) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Pipe Split Feature Properties Dialog Box) (on page 129)

General Tab (Pipe Split Feature Properties Dialog Box)

Displays and defines the general properties of the split feature.

NOTE Split features inherit some properties from the parent pipe run. If you change the pipe run property, the corresponding split properties also automatically change.

Category

Pipe split properties are divided into different categories: **Standard**, **Insulation and Tracing**, and **Surface Treatment and Coating**. You can select the category to define values by using the **Category** option.

Standard

Pipeline

Displays the system to which the split feature belongs. You cannot change the system of the split feature.

Pipe Run

Specifies the pipe run to which the split feature belongs. Other pipe runs in the same system as the original pipe run appear for selection.

Specification

Specifies the active pipe specification for the split feature. All the pipe specifications that are allowed to be selected as the system parent of the pipe run appear for selection. If appears in the box, the pipe specification is inherited from the pipe run to which the split feature belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run Specification**.

Nominal Diameter

Specifies the nominal diameter (NPD) of the split feature. If appears in the box, the NPD for the split feature is inherited from the pipe run to which the split feature belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run NPD**. If you have manually selected the part, the NPD of the selected part appears and cannot be changed.

Weld/Takedown Category

Select the category for the split.

Type

Displays the types of split features allowed by the selected **Specification**, **Nominal Diameter**, and **Weld/Takedown Category** options. Split features are listed by short codes. You can change the split feature type if needed. If you have manually selected the part, this box displays **Part selected manually** and cannot be changed.

Option

Displays a list of available split features. The software generates this list based on the pipe specification, the NPD, and the short code that you selected in the **Type** box. If you have manually selected the part, this box displays **Part selected manually** and cannot be changed.

Base Part Name

Displays the part name for the split feature. The software selects the part name using the pipe specification guidelines. Select the **Select Manually** option to override the pipe specification, and select the part number from the catalog. If you select a part manually, the **Nominal Diameter**, **Type**, and **Option** properties are disabled.

Correlation Status

Specifies whether or not the object has been correlated to an object in a P&ID. The list is defined by the EFWCorrelationStatus select list.

Correlation Basis

Specifies whether or not the object is correlated to a P&ID object. The list is defined by the EFWCorrelationBasis select list.

Correlate Object indicates that the object has a correlating object in a P&ID.

No correlation is required indicates that the object does not have a correlating object in a P&ID. **Correlation Approval Status**

Specifies whether or not the object is approved with discrepancies in the three-dimensional data compared with design basis data. The list is defined by the EFWCorrelationApprovalStatus sheet in the AllCodelist workbook.

Topology mismatch approved indicates that the object topology mismatch can be ignored.

Data and Topology mismatches approved indicates that the object data and topology mismatches can be ignored.

None indicates that you do not approve a mismatch.Insulation and Tracing Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Specifies the purpose of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Purpose** box. However, if **Insulation Specification** is manually defined, you can select the purpose of the insulation in this box. If **Insulation Specification** is a selected reference data insulation specification, the software reads the purpose from the insulation specification from the reference data and displays it here.

To change the options on the list, edit the **Insulation Purpose** select list in Catalog.

Insulation Material

Specifies the material of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Material** box. However, if **Insulation Specification** is manually defined, you can select the insulation material to use. If **Insulation Specification** is a selected reference data insulation specification, the software reads the material from the insulation specification as defined in the reference data and displays it here.

Select **More** to select an insulation material from the Catalog. To change the options on the list, edit the **Insulation Material** select list in Catalog.

Insulation Thickness

Specification box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of temperature (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius, for example).

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

See Also

Pipe Split Feature Properties Dialog Box (on page 129)

SECTION 9

Insert Component

Places components such as valves, steam traps, strainers, tees, turns, fire protection items, and other piping specialty items. When inserting components, the software automatically splits the pipe (straight or curved) and adds the necessary mating components when required. This command also places surface mounted components (such as ultrasonic flow meters or penetration sleeves) that do not split a pipe run.



You can add components either during the routing of a pipe run or after the pipe has been routed.

The system uses the pipe specification, nominal diameter of the selected pipe run, and the geometry of the insertion point to filter the available components. For example, if the insertion point is not at the end of a pipe run or at an equipment nozzle, turn components are not included in the list of available components. When you insert a component, the software generates any mating and connection parts required to connect the inserted part to the adjacent objects.

When inserting components, you can use the **Tools > Pinpoint** and **Tools > Point Along** commands to position components precisely in a pipe run. You can select this command and then select a component in a P&ID to correlate the component in the P&ID to the component in your model.

Pipe Run> from the **Run** list, the software populates the **Create New Run** dialog box with the properties belonging to the existing run (that is, the run you selected in which to insert the component). If the properties of the existing run do not match the defaults specified in the piping system, the software displays a dialog box asking you if you want to use the properties of the **System**, **Run**, or **None**.

Insert Component Ribbon

Sets options for adding a valve or other components into a pipe run.

Properties

Activates the **Pipe Component Feature Properties** dialog box. You can use this dialog box to specify how the specifications of the component are defined. You can specify component specifications in one of three ways:

- Select the pipe run into which the component is being placed.
- Select a specification directly.
- Select the part specification in the catalog.

ঈী Select Straight or End Feature

Select the pipe, pipe end, or nozzle on which you want to place a component.

Type

Displays a list of available component short codes based on the piping specification and nominal diameter of the object selected along with the geometry at the insertion location. Select the type of component that you want to insert.

- Select the <Specify Component Tag> option to specify the tagged component that you want to use. You can also select <Specify Component Tag> to place items available from retrieved Dimensional Data Sheet information. For more information, see Specify Component Tag Dialog Box (on page 96).
- Select Browse custom instruments to insert a custom instrument from the catalog.
 Clicking the Browse custom instruments option displays the Browse custom
 instruments dialog box. This dialog box allows you to browse custom instruments
 available in the catalog. For more information, see Browse custom instruments Dialog
 Box (on page 153).
- Select **Browse piping custom specialties** to insert a piping specialty component from the catalog. Clicking the **Browse piping custom specialties** option displays the **Browse piping custom specialties** dialog box. This dialog box allows you to browse piping custom specialties available in the catalog. For more information, see *Browse piping custom specialties Dialog Box* (on page 153).
- Select < Default Branch > to place the default branch component as defined in the branch table. This option is not available when you select a pipe end feature.
- Select <Default Turn> or <Default Reducer> to place the default turn or the default reducer as defined in the piping specification. The <Default Turn> and <Default Reducer> options are only available when you select a pipe end feature.

Option

Displays the option of the selected component. In addition, the **Option** drop down list contains any options defined in the piping specification for the short code selected in the **Type** list. Selecting a value from the **Option** list updates the objects. See *Pipe Specifications* in *Piping Reference Data Guide* for more information on defining pipe specifications.

Renter Insertion Point

Positions the component that you are placing along the pipe that you selected. You can use the **Tools > Pinpoint** and **Tools > Point Along** commands to define the precise location of the component on the pipe run.

Finish

Places the component in the pipe run.

Run

Specifies to which pipe run the component belongs to. If the component that you are placing is a branching or run change component, the software displays a list of run from which you can select. If you need a new run, select **<New Pipe Run>**. For more information on creating a pipe run, see *New Pipe Run Dialog Box* (on page 85).

Note If you specify that the component should be created as a new run by selecting New Pipe Run> from the Run list, the software populates the Create New Run dialog box with the properties belonging to the existing run (that is, the run you selected in which to insert the component). If the properties of the existing run do not match the defaults specified in the piping system, the software displays a dialog box asking you if you want to use the properties of the System, Run, or None.

Select **<New/Continue Pipe Run>** to automatically extend an existing pipe run by selecting the end feature of that pipe run. If a run is continued, all runs associated with the pipeline parent of the continued run appear in the list. If you do not select an end feature, the **New Pipe Run** dialog box automatically activates to create a pipe run. For more information, see *New Pipe Run Dialog Box* (on page 85).

Select **<Select from P&ID>** to graphically select a run in a P&ID to route. When you select the run in the P&ID, the software checks to see if the run already exists in the Smart 3D model. If the run does exist, the current run is set to that run. If the run does not exist, the **New Pipe Run** dialog box displays using values from the run that you selected in the P&ID as the defaults. When you click **OK**, the run is created, and then correlated to the run in the P&ID.

Select **<Select Graphically>** to select an existing run in a graphic view, the Workspace Explorer, or the P&ID View.

Name

Displays the name of the component being inserted.

₩ Flip

Select this option to change the component port that is connected to the selected port. If you are inserting a lateral, tee, or other tee-type branch into a length of pipe or between two other components, only the inline ports of the component are available. However, if you insert the same component at the end of a pipe or at a nozzle, all component ports are available.

Reference position

Slides the component that you are inserting so that its origin or selected port is positioned at the insertion point. If the selected reference position does not lie along the axis of the leg, then the software projects the position so that it intersects the axis and the component slides so that the projected point is located at the insertion point.

Select **Specify Reference Position** to select in the graphics window a mating part, or an associated port, that you want to use as the reference position. The **Reference position** box updates with the name of the object that you selected.

A Rotate

Select to rotate the component about the pipe interactively.

Angle

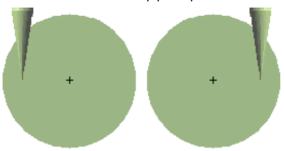
Type an angle at which you want the component rotated about the pipe.

Operator Angle

Type an angle at which you want the valve operator to be rotated about the valve stem. This angle does not affect the valve body.

Branch Position

Select which side of the pipe to place the non-radial tangential or non-tangential component.



Distance

Specifies the distance along the base component between the branch fitting or component and the specified reference port on the component. This option is available only when you select a base component.

Reference Port

Specifies the port on the base component from which to measure the distance to the branch component or the fitting. This option is available only when you select a base component.

Component Orientation

Sets the orientation for the branch fitting or component. This option is available only if the selected base component is a turn feature (such as an elbow or pipe bend), ALF end leg, or end component (cap, blind flange, and so forth).

- Aligns the branch fitting or component parallel to the base component. This is the default option.
- L Aligns the branch fitting or component perpendicular to the base component.

Modify Component Ribbon

Provides options for editing the components placed in the model.



Activates the properties dialog box for the selected component. See *Pipe Component Feature Properties Dialog Box* (on page 148) for more information.

Move From

Click to identify the origin of the move vector. If you do not define a starting point, the software assumes the current location of the component is the starting point.

Move To

Click to identify the termination point of the move vector.

Run

Specifies the name of the pipe run in which the component is placed.

Type

Displays the short code associated with the selected component. In addition, the **Type** list contains the short codes associated with any other components with similar geometry defined in the piping specification for the current nominal diameter. Selecting an entry from the **Type** list replaces the selected component with one of a different type.

Option

Displays the option of the selected component, if applicable. In addition, the **Option** list contains any other options defined in the piping specification for the short code selected in the **Type** list. For example, if two different rating values were available in the piping specification for the short code selected in the **Type** list, both options would appear in this list. Selecting a value from the **Option** list updates the object. See *Pipe Specifications* in *Piping Reference Data Guide* for more information on defining pipe specifications.

Name

Displays the name of the component that you are modifying. Type another name if needed.

₩ Flip

Select this option to change the component port that is connected to the selected port. If you are inserting a lateral, tee, or other tee-type branch into a length of pipe or between two other components, only the inline ports of the component are available. However, if you insert the same component at the end of a pipe or at a nozzle, all component ports are available.

Rotate

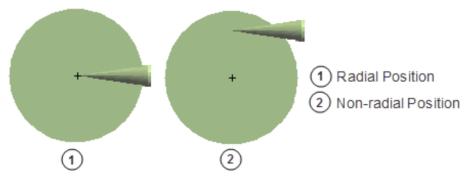
Select to rotate the component about the pipe interactively.

Angle

Type an angle at which you want the component rotated about the pipe.

Branch Position

Select the position of the branch centerline relative to the header centerline. Select **Radial** to place the branch such that its centerline intersects the header centerline. Select **Non-Radial** to place the branch such that its center line does not intersect the header centerline. If you select **Non-Radial**, you can specify the distance the branch centerline is offset from the header centerline up to being tangent to the outside diameter of the header.



Specify Component Tag Dialog Box

Allows you to specify the component that you want to use by the component tag. You activate this dialog box by selecting the **Insert Component** command, and then selecting **<Specify Component Tag>** from the **Type** option.

Source for Tags

Specifies the location of component tags in the Component Tag drop down list.

- Catalog Select this option to show components in the Catalog.
- Design Basis Select this option to show components in the referenced Design Basis.

Honor Specification

Select this option to show components that are only valid for the piping material class that the selected pipe is assigned.

Component tag

Displays a list of available tag numbers of components based on the pipe geometry and, if applicable, the pipe specification and schedule, at the insertion location. Select the tag of the component that you want to insert. You can also specify the name of an instrument that was retrieved from SmartPlant P&ID or SmartPlant Instrumentation.

Browse custom instrument Dialog Box

Allows you to specify piping custom instrument that you want to use from the catalog.

Instruments

Specifies the piping custom instrument that you want to place. The default option is **More**. Upon selection, the list is saved and displays the five most recently selected custom instruments, so that you need not browse the catalog and re-navigate.

■ NOTE Incompatible components are not displayed in the recently placed component list. For example, an Annubar Type is not shown in the recently placed component list when you are placing a component on a pipe straight feature.

Selecting **More** displays the **Select Instrument** dialog box. For more information, see *Select Instrument Dialog Box* (on page 153).

See Also

Insert Component (on page 134)

Browse piping custom specialties Dialog Box

Allows you to specify piping custom specialties that you want to use from catalog.

Specialties

Specifies the piping custom specialties that you want to place. The default option is **More**. Upon selection, the list is saved and displays the five most recently selected specialties, so that you need not browse the catalog and re-navigate.

NOTE Incompatible components are not displayed in the recently placed component list. For example, a Free Vent is not shown in the recently placed component list when you are placing a component on a pipe straight feature.

Selecting More displays the Select Piping Specialty dialog box. For more information, see

Select Piping Specialty Dialog Box (on page 155).

See Also

Insert Component (on page 134)

What do you want to do?

- Insert a component (on page 140)
- Insert a component while routing (on page 141)
- Insert a component by the component tag (on page 141)
- Insert an instrument (on page 142)
- Insert a piping specialty item (on page 142)
- Insert a surface mounted component (on page 143)
- Insert the default branch (on page 143)
- Insert the default turn (on page 144)
- Insert the default reducer (on page 144)
- Place a branch fitting on a component (on page 145)
- Place a branch fitting on a tap (on page 144)
- Place a tee from a P&ID (on page 145)
- Place an elbolet (on page 145)
- Select component settings (on page 146)
- Edit component properties (on page 146)
- Move a component (on page 146)
- Rotate a component (on page 147)
- Rotate a component on a nozzle (on page 147)
- Change the reducer type (on page 147)
- Create a specification break at a reducing component (on page 148)

Insert a component

- 1. Click **Insert Component** and on the vertical toolbar.
- 2. Select a pipe, pipe end, component port, or nozzle on which to insert the component. If you select a pipe, the point at which you identify the pipe is used as the placement point.
- 3. Select a component type and option in the **Type** and **Option** boxes.
- 4. If needed, change the position of the component using **Flip**, **Reference Position**, and **Angle** options on the ribbon.
- 5. Click Finish.

■ NOTE When placing components on a pipe, the software will use the divisor point location as the placement point if the divisor point glyph is displayed when you select the pipe. This functionality allows you to place a component at the mid-point of a pipe, for example. You can set the number of divisor points on the Tools > Options > SmartSketch3D tab.

Insert a component on a curved pipe

- 1. Click **Insert Component** and on the vertical toolbar.
- 2. Select the curved pipe on which to insert the component. The point at which you identify the curved pipe is used as the placement point.
- 3. Select the component type and option in the **Type** and **Option** boxes.
- 4. If needed, change the position of the component using **Flip**, **Reference Position**, and **Angle** options on the ribbon.
- Click Finish.

■ NOTE When placing components on a curved pipe, the software uses the divisor point location as the placement point if the divisor point glyph is displayed when you select the pipe. You can set the number of divisor points on the **Tools > Options > SmartSketch3D** tab.

Insert a component while routing

- 1. Click **Insert Component** and on the vertical toolbar.
- 2. Select the component type and option in the Type and Option boxes.
- 3. If needed, change the position of the component using **Flip**, **Reference Position**, and **Angle** options on the ribbon.
- 4. Click Finish.
- 5. Continue routing the pipe run.

NOTE When inserting components on the end feature of an arc pipe, you can use **Arc Routing** or **Straight Routing** options on the Insert Component ribbon bar to control the orientation of the pipe feature. If you select **Arc Routing**, then the inserted component is oriented such that you can continue to route an arc pipe feature from the other end of it. If you select **Straight Routing**, then the inserted component is oriented such that you can continue to route a straight pipe feature from the other end of it.

Insert a component by the component tag

- 1. Click **Insert Component** on the vertical toolbar.
- 2. Select the pipe, pipe end, or nozzle in which to insert the tagged component. If you select a pipe, the point at which you identify the pipe is used as the placement point.
- In the Type list, select <Specify Component Tag>.
 The Specify Component Tag dialog box displays.
- 4. In the Component tag box, select a component tag from the list of available tags.

- 5. Click OK.
- 6. Click **Finish** to confirm the component placement.

■ NOTE When placing instruments on a pipe, the software uses the divisor point location as the placement point if the divisor point glyph is displayed when you select the pipe. This functionality allows you to place instruments at the mid-point of a pipe for example. You can set the number of divisor points on the Tools > Options > SmartSketch3D tab.

Insert an instrument

- 1. Click Insert Component and on the vertical toolbar.
- 2. Select the pipe, pipe end, or nozzle in which to insert the piping specialty item. If you select a pipe, the point at which you identify the pipe is used as the placement point.
- 3. In the Type list, select Browse custom instruments.

The Browse custom instruments dialog box displays.

- 4. In the **Instrument** box:
 - a. Select More.
 - NOTE When you are placing the component for the first time, **More** is the only option that displays.

The **Select Instrument** dialog box displays.

- b. Select a component from the catalog, and then click **OK**.
- c. Skip to step 5.

OR

- d. Select a recently placed component from the list, and then click **OK**.
- 5. Click **Finish** to confirm the component placement.

NOTE When placing instruments on a pipe, the software uses the divisor point location as the placement point if the divisor point glyph is displayed when you select the pipe. This functionality allows you to place instruments at the mid-point of a pipe for example. You can set the number of divisor points on the **Tools > Options > SmartSketch3D** tab.

Insert a piping specialty item

- 1. Click **Insert Component** on the vertical toolbar.
- 2. Select the pipe, pipe end, or nozzle in which to insert the piping specialty item. If you select a pipe, the point at which you identify the pipe is used as the placement point.
- 3. In the Type list, select Browse piping custom specialties.

The **Browse piping custom specialties** dialog box displays.

- 4. In the Specialties box:
 - a. Select More.

■ NOTE When you are placing the component for the first time, **More** is the only option that displays.

The Select Piping Specialty dialog box displays.

- b. Select a component from the catalog, and then click **OK**.
- c. Skip to step 5.

OR

- d. Select a recently placed component from the list, and then click **OK**.
- 5. Click Finish to confirm the component placement.

NOTE When placing piping specialty items on a pipe, the software uses the divisor point location as the placement point if the divisor point glyph is displayed when you select the pipe. This functionality allows you to place an item at the mid-point of a pipe for example. You can set the number of divisor points on the **Tools > Options > SmartSketch3D** tab.

Insert a surface mounted component

- 1. Click **Insert Component** on the vertical toolbar.
- 2. Select the pipe on which to insert the surface mounted feature. The point at which you identify the pipe is used as the placement point.
- 3. Select the surface mounted component short code and option in the **Type** and **Option** boxes.
- 4. If needed, change the position of the component using the **Reference Position**, and **Angle** options on the ribbon.
- 5. Click Finish.

NOTE You must bulkload the **Sample Data for Surface Mounted Components using PCF.xIs** workbook before you can place surface mounted components.

Insert the default branch

- 1. Click **Insert Component** and on the vertical toolbar.
- 2. Select the pipe, pipe end, component port, or nozzle on which to insert the default branch. If you select a pipe, the point at which you identify the pipe is used as the placement point.
- 3. In the **Type** box on the ribbon, select **<Default Branch>**.
- 4. In the **Run** box on the ribbon, define the pipe run for the branch by either selecting an existing run or by using the **New Pipe Run** dialog box to create a new pipe run.

The software uses the branch table to place the correct default branch feature.

- 5. If needed, change the position of the component using **Flip**, **Reference Position**, and **Angle** options on the ribbon.
- 6. Click Finish.

■ NOTE When placing components on a pipe, the software will use the divisor point location as the placement point if the divisor point glyph ② is displayed when you select the pipe. This

functionality allows you to place a component at the mid-point of a pipe for example. You can set the number of divisor points on the **Tools > Options > SmartSketch3D** tab.

Insert the default turn

- 1. Click **Insert Component** on the vertical toolbar.
- 2. Select the pipe end, component port, or nozzle on which to insert the default turn.
- 3. In the **Type** box on the ribbon, select **<Default Turn>**.
 - The software reads the piping specification to determine the default turn to use.
- 4. If needed, change the position of the turn using **Turn Angle**, **Reference Position**, and **Angle** options on the ribbon.
- 5. Click Finish.

Insert the default reducer

- 1. Click **Insert Component** and on the vertical toolbar.
- 2. Select the pipe end, component port, or nozzle on which to insert the component.
- 3. In the **Type** box on the ribbon, select **<Default Reducer>**.
- 4. In the **Run** box on the ribbon, define the new pipe run for the other side of the reducer.

 The software reads the piping specification to determine the correct default reducer to place.
- 5. If needed, change the position of the component using **Reference Position** and **Angle** options on the ribbon.
- 6. Click Finish.

Place a branch fitting on a tap

- 1. Select the tap.
- 2. Click **Insert Component** and on the vertical toolbar.
- 3. On the ribbon bar, select **<New Pipe Run>** from the **Run** box.
- 4. In the **Type** drop-down list, select a branch component.

 The software places the selected branch component on the tap.
- 5. Click Finish.
- *TIP When you route from a tap, a branch fitting is automatically generated by the software. If you delete the tap, the automatically generated branch fitting also gets deleted.

Place a branch fitting on a component

- 1. Click Insert Component and on the vertical toolbar.
- 2. Click the component on which to place the branch fitting.
- 3. On the ribbon bar, select the pipe run in which to insert the branch fitting.
- 4. In the **Type** box, select a branch component.
- 5. If necessary, specify the distance and reference port to position the branch fitting.
- 6. Click **Component Orientation** II, and set the orientation for the branch fitting. This step is applicable if the base component is a turn feature (such as an elbow or pipe bend), ALF end leg, or end feature (cap, blind flange, and so forth).
- 7. Click Finish.
- TIP When you route from the branch fitting, the software automatically generates a tap. If you delete the branch fitting, the automatically generated tap also gets deleted.

Place a tee from a P&ID

- 1. Click **SmartPlant > Retrieve** to retrieve the P&ID drawing that contains the pipe runs for that branch. You can skip this step if the P&ID has already been retrieved.
- 2. Click SmartPlant > View P&ID to view the P&ID drawing that contains pipe runs.
- 3. Review the P&ID to determine where you need to insert the tee or branch in the model. Specifically, you need to identify the header and branch pipe runs.
- 4. Click **Insert Component** and on the vertical toolbar.
- 5. Select the header run in which to insert the tee or other branch component.
- 6. Select the component type and the option in the **Type** and **Option** boxes.
- 7. Position the component on the header pipe run.
- 8. Click Finish.
- 9. Using the **Route Pipe** command, route the branch pipe run into the branch component that you just placed on the header pipe run.
 - TIP As you model and branch into a header line, a tee is automatically generated by the software.

Place an elbolet

- Click Insert Tap **.
- 2. Select the elbow on which to place the elbolet.
- 3. From the **Option** list, select a tap size that is the same size as the elbolet's first size.
- 4. Click Finish.
- 5. Click Insert Component

- 6. Select the tap that you just placed on the elbow.
- 7. From the Type list, select Elbolet.
- 8. Click Finish.

Select component settings

- 1. Click **Properties** on the ribbon.
- 2. If needed, select the type and option for the component in the **Type** and **Option** boxes. Other properties can be modified as needed.
- 3. Place the component.

NOTE The **Configuration** tab and **Relationship** tab of the properties dialog box are available only when you edit an existing object.

Edit component properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter box.
- 3. Select the component, such as a valve, to edit.
- 4. Click Edit > Properties.
- 5. Edit the component properties.

■ NOTES

- Use the Rotate option on the ribbon bar to dynamically rotate the component. Use the Angle option to type the rotation angle.
- You also can click Properties on the ribbon to edit component properties.

Move a component

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the component, such as a valve, to move.
- 4. Click Move To 7.
- 5. Specify the new component location.

NOTES

- If you do not select a move from location, the current location of the object is used as the from location.
- You can use the Tools > Point Along and Tools > Pinpoint commands to locate the component precisely.

Rotate a component

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the component, such as a valve, to rotate.
- 4. Click **Rotate** A and move the mouse to rotate the component.
- 5. Click to release the component at the new rotation angle.
- **NOTE** You also can enter a rotation angle in the **Angle** box.

Rotate a component on a nozzle

- 1. In the Locate Filter, select Piping Features.
- 2. Click **Select** on the vertical toolbar.
- 3. Select the end feature (that is not connected to the nozzle) on the component to rotate.
- 4. Lock the plane control to a plane that is perpendicular to the axis of rotation.
- 5. Lock the length control.
- 6. Click Move To 3.
- 7. Move the cursor to rotate the component.

Change the reducer type

- 1. Select a reducer or reducer pair.
- 2. On the Edit Component Ribbon bar, click Properties ...
- 3. In the Pipe Component Feature Properties Dialog Box, select the required Type option:
 - a. Eccentric size change Replaces a concentric reducer with an eccentric reducer.
 - b. Concentric size change Replaces an eccentric reducer with a concentric reducer.
- 4. Click OK.

★ IMPORTANT

- In case of a reducer pair, you can change the orientation using the **Angle** option on the properties dialog box. Modification to rotation angle applies to both reducers as per their leg orientation, such that the offset is zero. The reducer that you select first is considered the master. When you change the rotation angle, the modified angle is applied to the master, and the angle of another reducer is computed such that the offset is zero.
- You cannot modify the rotation angle for multiple reducers.

Create a specification break at a reducing component

If you want to use a reducing component to connect two pipe runs with different specifications:

- 1. On the first pipe run, click **Insert Component** to place a flange, setting **Type** to **Flange** and **Option** to **300#**.
- 2. Select the end feature of the flange, click **Route Pipe** \mathscr{F} , and route the second pipe run with its different specification.
- 3. Select the existing flange, change the **Type** to **Reducing Flange**, and then click **Finish**.

Pipe Component Feature Properties Dialog Box

Displays properties for component features, such as valves, for review and editing.

Edit component properties (on page 146)
Configuration Tab (on page 269)
Relationship Tab (on page 278)
General Tab (Pipe Component Feature Properties Dialog Box) (on page 148)
Defaults Tab (Pipe Component Feature Properties Dialog Box) (on page 152)

General Tab (Pipe Component Feature Properties Dialog Box)

Displays and defines the general properties of the component feature.

NOTE Component features inherit some properties from the parent pipe run. If you change the pipe run property, the corresponding component properties also changes automatically.

Category

Component properties are divided into different categories: All, Standard, Insulation and Tracing, and Surface Treatment and Coating. You can select the category to define values for by using the Category option.

Standard

Pipeline

Displays the system to which the component feature belongs. You cannot change the system of the component feature.

Pipe Run

Specifies the pipe run to which the component feature belongs. Other pipe runs in the same system as the original pipe run appear for selection.

Specification

Specifies the active pipe specification for the component feature. All pipe specifications that are allowed for the system parent of the pipe run appear for selection. If appears in the box, the pipe specification is inherited from the pipe run to which the component feature belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run Specification**.

Nominal Diameter

Specifies the nominal diameter (NPD) of the component feature. If appears in the box, the NPD for the component feature is inherited from the pipe run to which the component feature belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select Use Run NPD. If you have manually selected the part, the NPD of the selected part appears as a read-only value.

Type

Displays the types of component features allowed by the selected **Specification** and Nominal Diameter. Component features are listed by short codes. You can change the component feature type if needed. If you have manually selected the part, Type displays as Part selected manually and cannot be changed.

Option

Displays a list of available component features. The software generates this list based on the pipe specification, the NPD, and the short code that you selected in the **Type** box. If you have manually selected the part. Option displays as Part selected manually and cannot be changed.

Base Part Name

Displays the part name for the component feature. The software selects the part name using the pipe specification guidelines. Select the **Select Manually** option to override the pipe specification, and select the part number from the catalog. If you select a part manually, the Nominal Diameter, Type and Option properties are disabled.

Correlation Status

Specifies whether or not the object has been correlated to an object in a P&ID. The list is defined by the EFWCorrelationStatus select list.

Correlation Basis

Specifies whether or not the object is correlated to a P&ID object. The list is defined by the EFWCorrelationBasis select list.

Correlate Object indicates that the object has a correlating object in a P&ID.

No correlation is required indicates that the object does not have a correlating object in a P&ID.

Correlation Approval Status

Specifies whether or not the object is approved with discrepancies in the three-dimensional data compared with design basis data. The list is defined by the EFWCorrelationApprovalStatus sheet in the AllCodelist workbook.

Topology mismatch approved indicates that the object topology mismatch can be ignored.

Data and Topology mismatches approved indicates that the object data and topology mismatches can be ignored.

None indicates that you do not approve a mismatch.

Insulation and Tracing

Insulation Specification

Specifies the insulation specification for the object. If Inherited Properties or Spec 💥



displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Displays the purpose of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, the information in this box cannot be changed. However, if **Insulation Specification** is manually defined, select the purpose of the insulation in this box. Available purposes are read from the reference data.

Insulation Material

Specifies the material of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, this field cannot be changed. However, if **Insulation Specification** is manually defined, select the insulation material from those available from the reference data.

The list contains the last five insulation materials selected. Click **More** to browse the catalog for the insulation material to use. If you set this field to **Not Insulated**, the **Insulation Thickness** field is disabled. If you set this field to **Use Run Material**, the along leg feature inherits the insulation material from the duct run.

To change the options on the list, edit the Insulation Material select list in Catalog.

Insulation Thickness

Specifies the thickness of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of temperature (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius, for example).

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

Defaults Tab (Pipe Component Feature Properties Dialog Box)

Displays and defines the default properties of the component feature. This tab is available only when inserting a component on a pipe run.

■ NOTE In a new session file, when you insert a component on a correlated run for the first time the software displays the P&ID File Viewer.

Display P&ID Viewer

Allows you to enable or disable the P&ID File Viewer while inserting a component. The default value is **True**. The software retains your preference for the current session.

- True Opens the P&ID File Viewer, or brings the P&ID File Viewer to foreground if it is already open.
- False Disables the P&ID File Viewer. If the P&ID File Viewer is already open, then it remains in the background.

OK

Saves the preference, and closes the dialog box.

Cancel

Closes the dialog box without saving the changes.

Browse custom instruments Dialog Box

Allows you to specify piping custom instrument that you want to use from the catalog.

Instruments

Specifies the piping custom instrument that you want to place. The default option is **More**. Upon selection, the list is saved and displays the five most recently selected custom instruments, so that you need not browse the catalog and re-navigate.

NOTE Incompatible components are not displayed in the recently placed component list. For example, an Annubar Type is not shown in the recently placed component list when you are placing a component on a pipe straight feature.

Selecting **More** displays the **Select Instrument** dialog box. For more information, see *Select Instrument Dialog Box* (on page 153).

See Also

Insert Component (on page 134)

Browse piping custom specialties Dialog Box

Allows you to specify piping custom specialties that you want to use from catalog.

Specialties

Specifies the piping custom specialties that you want to place. The default option is **More**. Upon selection, the list is saved and displays the five most recently selected specialties, so that you need not browse the catalog and re-navigate.

NOTE Incompatible components are not displayed in the recently placed component list. For example, a Free Vent is not shown in the recently placed component list when you are placing a component on a pipe straight feature.

Selecting **More** displays the **Select Piping Specialty** dialog box. For more information, see *Select Piping Specialty Dialog Box* (on page 155).

See Also

Insert Component (on page 134)

Select Instrument Dialog Box

Allows you to select the piping custom instrument that you want to place. This dialog box appears when you are inserting a component. By browsing through the custom instruments hierarchy, you can find the applicable component in the catalog. After you select a component, the software returns you to the model, where you can finalize placement.

<table-cell-rows> Back

Returns you to the previously selected location. Use this command to navigate through the hierarchy to the specific part you need.

Forward

Sends you to the last selected location that you moved away from by using the **Back** button. Use this command to navigate through the hierarchy to the specific part you need.

Up One Level

Brings up the next highest level of the catalog hierarchy. Use this command to navigate through the hierarchy to the specific part you need.

Copy

Copies the selected object. This command is available only in the Catalog task.

Paste

Pastes a copied object. This command is available only in the Catalog task.

X Delete

Deletes the selected object. This command is available only in the Catalog task.

Undo

Reverses the most recent operation. This command is available only in the Catalog task.

New Object

Creates a new object. This command is available only in the Catalog task.

Move Up

Moves up one object. The level in the hierarchy remains the same.

Move Down

Moves down one object. The level in the hierarchy remains the same.

Properties

Displays the properties of the selected part. Because you cannot modify any properties until the part is placed, all properties on the dialog box are read-only.

Preview

Displays a picture of the selected part. The image file must be assigned to the part in the reference data.

Filter

Filters data in the grid view by the existing data in the grid. You must have the **Grid View**active to filter. You cannot filter the **List View**.

2 √ Sort

Activates the **Sort** dialog box, which you can use to sort data on multiple columns. The software saves the sort information in the catalog database, not your session file. For more information, refer Catalog help.

Customize Current View

Activates the **Customize Current View** dialog box, which you can use to show and hide property columns and control the property column display order (the order from left to right). For more information, refer Catalog help.

List View

Sets the dialog box to display the parts in a list view.

Grid View

Sets the dialog box to display the parts in a spreadsheet-style grid view.

Check Data

Checks the consistency of the data in the grid against other data in the catalog. This command is available only in the Catalog task.

Address

Specifies your exact location within the displayed hierarchy.

See Also

Browse custom instruments Dialog Box (on page 153) Insert Component (on page 134)

Select Piping Specialty Dialog Box

Allows you to select the piping specialty component to be placed. This dialog box appears when you are inserting a component. By browsing through the custom specialties hierarchy, you can find the applicable component in the catalog. After you select a component, the software returns you to the model, where you can finalize placement.

Back

Returns you to the previously selected location. Use this command to navigate through the hierarchy to the specific part you need.

➡ Forward

Sends you to the last selected location that you moved away from by using the **Back** button. Use this command to navigate through the hierarchy to the specific part you need.

Level Up One Level

Brings up the next highest level of the catalog hierarchy. Use this command to navigate through the hierarchy to the specific part you need.

Copy 🖺

Copies the selected object. This command is available only in the Catalog task.

Paste

Pastes a copied object. This command is available only in the Catalog task.

× Delete

Deletes the selected object. This command is available only in the Catalog task.

Undo

Reverses the most recent operation. This command is available only in the Catalog task.

New Object

Creates a new object. This command is available only in the Catalog task.

1 Move Up

Moves up one object. The level in the hierarchy remains the same.

Move Down

Moves down one object. The level in the hierarchy remains the same.

Properties

Displays the properties of the selected part. Because you cannot modify any properties until the part is placed, all properties on the dialog box are read-only.

Preview

Displays a picture of the selected part. The image file must be assigned to the part in the reference data.

Filter

Filters data in the grid view by the existing data in the grid. You must have the **Grid View**active to filter. You cannot filter the **List View**

A ↓ Sort

Activates the **Sort** dialog box, which you can use to sort data on multiple columns. The software saves the sort information in the catalog database, not your session file. For more information, refer Catalog help.

X Customize Current View

Activates the **Customize Current View** dialog box, which you can use to show and hide property columns and control the property column display order (the order from left to right). For more information, refer Catalog help.

List View

Sets the dialog box to display the parts in a list view.

Grid View

Sets the dialog box to display the parts in a spreadsheet-style grid view.

Check Data

Checks the consistency of the data in the grid against other data in the catalog. This command is available only in the Catalog task.

Address

Specifies your exact location within the displayed hierarchy.

See Also

Browse piping custom specialties Dialog Box (on page 153) Insert Component (on page 134)

SECTION 10

Insert Tap

Flaces a tap on components in the model. Use this command when you need a tap for a drain, vent, or instrument connection. You can place taps on all piping components; elbows, tees, caps, valves, pipes, pipe bends, and so forth; except for mating parts.



Insert Tap Ribbon

Sets options for adding a tap to a valve or other component.

Select Part

Select the component in which you want to place the tap. You can select any piping component; elbow, pipe bend, tee, cap, valve, pipe, and so forth; except a mating part.

Option

Displays a list of available tap sizes that you can place in the selected component. The software generates this list based on the pipe specification of the component into which you are inserting the tap. See *Pipe Specifications* in *Piping Reference Data Guide* for more information on defining pipe specifications.

Finish

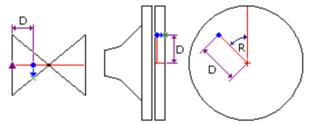
Places the tap in the component.

Distance

Specify the distance along the component between the tap and the specified reference position on the component.

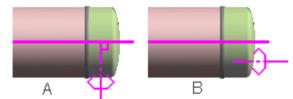
If **Orientation** is set to perpendicular, the distance is measured along the length of the component path as shown on the valve below. For pipe bends, the distance is measured from the reference port to the tap location along the arc of the turn feature.

If **Orientation** is set to parallel, the distance is measured from the specified reference point and at the specified angle as shown on the blind flange below.



||/上 Orientation

Defines whether the tap is perpendicular (A) or parallel (B) to the selected component. This option is available only when you select an end feature (cap, blind flange, and so forth) or a turn feature (such as an elbow or pipe bend) as the component. For straight pipes and tubes, and the straight sections of a pipe bend, the orientation is always set to perpendicular. For pipe bends, the tap is always placed perpendicular to the flow direction throughout the turn.



Reference position

Specifies the port on the component from which to measure the distance to the tap.

A Rotate

Select to rotate the tap about the component interactively.

Angle

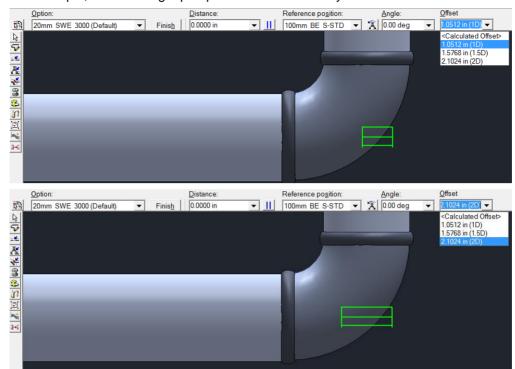
Type an angle at which you want the tap rotated about the component.

Offset

Specifies the tap depth. Type a depth value, or select one of the following values:

- <Calculated Offset> The minimum offset, based on the tap outer diameter and the surface geometry of the tapped feature.
- 1D
- 1.5D
- 2D

NOTE The available values are multipliers of the tap outer diameter, D.



For example, the following tap depths are shown when you select 1D and 2D:

Modify Tap Ribbon

Changes options for taps placed in the model.

Option

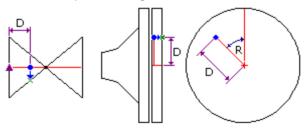
Displays a list of available tap sizes that you can place in the selected component. The software generates this list based on the pipe specification of the component on which you inserted the tap. See *Pipe Specifications* in *Piping Reference Data Guide* for more information on defining pipe specifications.

Distance

Specify the distance along the component between the tap and the specified reference position on the component.

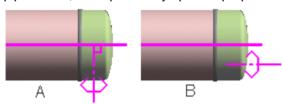
If **Orientation** is set to perpendicular, the distance is measured along the length of the component path as shown on the valve below. For pipe bends, the distance is measured from the reference port to the tap location along the arc of the turn feature.

If **Orientation** is set to parallel, the distance is measured from the specified reference point and at the specified angle as shown on the blind flange below.



Orientation

Defines whether the tap is perpendicular (A) or parallel (B) to the path passing through the port. This option is available only when you select an end feature (cap, blind flange, and so forth) or a turn feature (such as an elbow) as the component. For straight pipes and tubes, and the straight sections of a pipe bend, the orientation is always set to perpendicular. For pipe bends, the tap is always placed perpendicular to the flow direction throughout the turn.



Reference position

Specifies the port on the component from which to measure the distance to the tap.

Rotate

Select to rotate the tap about the component interactively.

Angle

Type an angle at which you want the tap to be rotated about the component.

Offset

Specifies the tap depth. Type a depth value, or select one of the following values:

- <Calculated Offset> The minimum offset, based on the tap outer diameter and the surface geometry of the tapped feature.
- 1D
- 1.5D
- 2D

NOTE The available values are multipliers of the tap outer diameter, D.

What do you want to do?

- Insert a tap (on page 160)
- Move a tap (on page 161)
- Rotate a tap (on page 161)
- Edit tap properties (on page 161)
- Delete a tap (on page 161)

Insert a tap

- 1. Click **Insert Tap** ** on the vertical toolbar.
- 2. Select the cap, elbow, tee, pipe, or other component in which to insert the tap. You cannot select a mating part.

- 3. Select the tap ID in the **Option** box.
- 4. If necessary, select a reference position other than the default. As the cursor moves over each entry in the list, the corresponding position highlights in the 3D model view.
- 5. Optionally, type a distance relative to the reference position to place the tap.
- 6. Rotate the tap, if necessary.
- 7. Click Finish.

Move a tap

- 1. Click **Select** on the vertical toolbar.
- 2. Select Taps in the Locate Filter.
- 3. Select the tap to move.
- 4. Type a new distance, orientation, or rotation value.

Rotate a tap

- 1. Click **Select** on the vertical toolbar.
- 2. Select Taps in the Locate Filter.
- 3. Select the tap to rotate.
- 4. Click **Rotate** A and move the mouse to rotate the tap.
- **NOTE** You also can enter a rotation angle in the **Angle** box.

Edit tap properties

- 1. Click **Select** on the vertical toolbar.
- 2. Select Taps in the Locate Filter box.
- 3. Select the tap to edit.
- 4. Click Edit > Properties.

Delete a tap

- 1. Click **Select** on the vertical toolbar.
- 2. Select Taps in the Locate Filter.
- 3. Select the tap to delete.
- 4. Click **Delete** ★ on the toolbar.

Pipe Tap Feature Properties Dialog Box

Displays tap feature properties for review and editing.

Edit Tap Properties (on page 161) Configuration Tab (on page 269)

SECTION 11

Spooling

Spools are collections of piping parts and the welds that hold them together. The software creates these spool assemblies by applying a set of rules that breaks the assemblies into pieces of a pipeline system. Each piece ends with a spool-breaking component or connection type. After a pipeline, block, or WBS item is spooled, the pipeline, block, or WBS item becomes the parent object of the spools. This process allows spools to be named after the pipeline, block, or WBS item and keeps track of spools that may be out of date, based on the modification date of the parent object.

There are two types of spools. **Standard** spools are based solely upon the pipeline that contains the spools and a set of spooling rules. **Penetration** spools can include parts from one or more pipeline systems. Each of the penetration spools is welded to a common penetration plate.

Generate Spools and Create Penetration Spools provide a dialog box on which you can select objects for spooling. Each spool must consist of connected objects for the spooling to occur without errors. After generating the spools, the software stores them in the Model database and displays the spools on the Assembly tab in the Workspace Explorer.

After a spool is generated, the spool can be used to create an isometric drawing for fabrication. These drawings, typically referred to as spool sheets, are tied to the spool and are marked as being out-of-date if the spool is subsequently modified. The spool information can also be included on erection (construction) isometrics. To display the latest spool information on isometric drawings, set the option for showing spool piece identifiers for an isometric drawing style. Then, extract some test drawings using the updated isometric drawing style.

What Spools Include

The software includes in spools any piping component or piece of pipe that is assigned a fabrication type of *by fabricator*. Implied objects (such as bolts, nuts, and gaskets) that are associated with these parts are not included in spools. You can specify options to include an entire pipe support or pipe support parts in the same spool as the components to which they are welded. The supports must have the fabrication requirement set to *by fabricator*, the fabrication type set to *shop fabricated*, and the fabrication responsibility set to *by piping*. These are set in the support properties dialog box under the **Fabrication and Construction** and **Responsibility** categories on the **General** tab.

Additionally, the software provides the ability to create penetration spools, which are used in marine and offshore projects. In penetration spools, multiple piping spools are included in the assembly along with the common penetration plate to which they are attached.

Where Spools Break

When the software processes a pipeline system, spools are created by identifying components or end-preparations that represent intrinsic breaks in the line. The software always breaks spools at field welds, bolted connections, and compression fittings. You can specify whether or not spools break at unions.

In addition, you can place control points at connection objects using the **Insert > Control Point** command to break spools along the pipeline. You have the option to break only at control points,

break at control points and intrinsic breaks, or to ignore control points. For more information, see the *Spool Break by Control Point* information in *Options Tab (Spool Generation Dialog Box)* (on page 167).

If the software finds a gap when processing a pipeline system, the software breaks the spool and proceeds with processing the remainder of the pipeline.

How Spools Are Named

The software uses a default naming rule to give each spool a unique name. The default spool name contains a prefix based on the spool parent and a mark number. The mark number ensures that the spool name is unique and to provide a sequencing of spools within a pipeline. You can modify the naming rules to match your company needs. For more information about naming rules, see the *Smart 3D Reference Data Guide* available from the **Help > Printable Guides** command.

You also can interactively change the name of a spool by selecting it, displaying the **Properties** dialog box, and typing a different name.

Changing the Spooling Basis

You can base your spools on pipelines, planning blocks, or WBS items depending on your needs. If you need to change the spooling basis after spooling has begun, we recommend that you delete any existing spools, change the spooling basis, and then create new spools using the new spooling basis.

To change the spooling basis, in Microsoft Excel, open the [Product Folder]\CatalogData\Bulkload\Datafiles\BulkLoadIsoKeys.xls workbook. On the PipeMfgSpoolRule sheet in the SpoolingBasis column, type 0 to spool by pipelines, 1 to spool by planning blocks, or 2 to spool by WBS items. In column A of that row, be sure to put an M to indicate that you have modified the line. Save and exit the workbook. Bulkload the workbook to your catalog using the Add, modify, or delete records in existing catalog option.

Specifying Oversized Spools

At creation time, the software checks the size of each spool against the maximum length, height, and width spool dimensions that you can specify. The default values in the reference data are 40 feet by 8 feet by 8 feet, and you can temporarily change these values if required. To change the dimension values permanently, edit options on the **PipeMfgSpoolRule** sheet in the **BulkLoadIsoKeys.xIs** workbook and then bulkload the workbook into the catalog.

The software marks spools that exceed the maximum size as oversized so that the designer can insert additional breaks as needed. This check helps to ensure the spools that require dipping in a tank for galvanization, descaling and pickling, and so forth will actually fit in the immersion tank. Also, spools can be marked oversized that are too large to fit in fabrication equipment such as bending machines or annealing ovens, or are too large for shipping. You can check for oversized spools in the following ways:

- View the Assembly tab of the Workspace Explorer. The icon for an oversized spool contains
- Click File > Define Workspace and view the Assembly tab on the Filter Properties dialog box. Again, the icon for an oversized spool contains
- View the Properties dialog box for the spool. The SpoolOversizedFlag property on the Occurrence tab is set to True if the spool is oversized.

Updating Spools

The software uses a detailed change management routine that prevents existing spools from being arbitrarily renumbered. When a pipeline is re-spooled, only the portion of the pipeline that has changed is impacted by the changes to its spools. New spools are only created as needed and existing spools do not lose their numbers (even if the result is that the numbers are now out of sequence within the pipeline). Existing spools are only deleted as required. This change management ensures that spools are not needlessly modified and that spool sheets are not marked as being out-of-date unless that is absolutely the case.

Deleting Spools

You can delete spools by selecting them on the **Assembly** tab of the **Workspace Explorer** and then selecting **Delete**. The piping parts that were assigned to the deleted spool are reassigned to the deleted spool assembly's parent object. In addition, the software automatically deletes a spool when the last part in the spool is deleted.

Generate Spools

Breaks pipelines into spools. You can view the spools on the **Assembly** tab in the **Workspace Explorer**.

Spool Generation Dialog Box (on page 166) Spool Properties Dialog Box (on page 170)

What do you want to do?

- Create spools (on page 165)
- Edit spool properties (on page 166)
- Delete a spool (on page 166)

Create spools

- 1. On the vertical toolbar, click **Generate Spools** 3.
- 2. Click the **Spooling** tab.
- 3. Select the pipelines, planning blocks, or WBS items to spool.
 - TIP Use the WBS Item Type and WBS Item Purpose boxes to aid in the selection of WBS items to spool.
- 4. Click the **Options** tab.
- Review the spooling options and edit, if needed.
- 6. Click OK.
- 7. Click the **Log** tab.
- 8. Review the spooling log. Click **Save Log** to save the log to a text file, if required.

■ NOTES

After spooling, you can view the spools on the Assembly tab in the Workspace Explorer.

- To show spool identification numbers on an isometric drawing, set Drawing > Content > Show Spool ID to True in the Isometric Style Options Browser.
- You can switch between spooling pipelines, spooling planning blocks, and spooling WBS items. For information on how to switch, see *Spooling* (on page 163).

Edit spool properties

- On the Assembly tab in the Workspace Explorer, select a spool, either a standard spool or a penetration spool.
 - TIP To create standard piping spools, click **Generate Spools**. To create penetration spools, click **Create Penetration Spools**.
- 2. Click Edit > Properties.
- 3. Edit the properties as necessary.
- **NOTE** The **SpoolOversizedFlag** property on the **Occurrence** tab is set to **Yes** if the spool is oversized.

Delete a spool

- 1. On the vertical toolbar, click **Select** .
- 2. In the Locate Filter, click Spools.
- 3. Click the Assembly tab of the Workspace Explorer.
- 4. Select the spool to delete. You can also select the spool in the model.
- Click Delete X.

■ NOTES

- Parts that were assigned to the deleted spool are automatically reassigned to the deleted spool's parent object in the Workspace Explorer.
- The software automatically deletes a spool when the last part in the spool is deleted.
- If you delete an existing spool, sequencing does not reuse the deleted ID.

Spool Generation Dialog Box

Allows you to specify the pipeline systems, planning blocks, or WBS items that you want to spool. You use this dialog box when generating standard spools. If you want to generate penetration spools, click the **Generate Penetration Spools** command.

OK

Processes the pipelines into spools using the options that you specify.

Cancel

Exits the dialog box.

Save Log

Saves the information on the **Log** tab to a text file. For more information, see *Log Tab* (*Spool Generation Dialog Box*) (on page 170).

Refresh Options from Catalog

Reloads the spool options that are defined in the catalog to the **Options Tab**. For more information, see *Options Tab* (*Spool Generation Dialog Box*) (on page 167).

Spooling Tab

Allows you to select the objects that you want to spool. For the **Generate Spools** command, you can choose pipeline systems, planning blocks, or WBS items. For the **Generate Penetration Spools** command, you can choose penetration plates.

If you spool by WBS items, two additional drop-down items for **WBS Item Type** and **WBS Item Purpose** appear on the **Spooling** tab. While you are not required to set these options before spooling, the drop-down options provide you with the ability to spool WBS items based on the type and purpose. For example, if you select a **WBS Item Type** of "Design Area" and a **WBS Item Purpose** of "Piping," the WBS items with this particular type and purpose are automatically selected in the tree view, allowing you to spool only these WBS items.

See Also

Generate Spools (on page 165) Spooling (on page 163) Delete a Spool (on page 166) Create Spools (on page 165)

Options Tab (Spool Generation Dialog Box)

Displays the spooling options to use. Each time you open the session file all spooling options default to the spool settings saved in the catalog. You can change the spooling options if needed for a special situation, but you cannot save your changes to the catalog or to the session file. The next time you open your session file, the spool options default to the catalog settings.

If you need to change the spooling options in the catalog, edit options on the **PipeMfgSpoolRule** sheet in the **BulkLoadIsoKeys.xIs** workbook and then bulkload the workbook into the catalog.

Name Rule

Specifies the naming rule for spools.

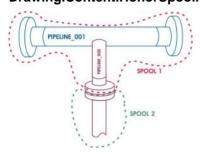
Break Spools at Union

Specifies that the software breaks the spools at unions. The union part must have its **Commodity Type** property set to "Union" for the spooling software to recognize the union as a break point.

Include Stub Ins with Header Spool

Specifies that a spool can include the stub-in pipe and all the parts of this stub-in branch until the first spool-breaking component is encountered. For example, by setting this option to **True**, the software spools the stub-in and flange for the isometric drawing with Pipeline 001 even though the stub-in and flange do not belong to Pipeline 001. When

creating isometric drawings for Pipeline_001 in the Drawings and Reports task, you must use the **Isometric Style Options Browser** to set the **Drawing.Content.HonorSpoolAtBranch** option to **True**.



Include Items Welded to Pipe in Spools

Includes welded objects, such as pipe hanger or support parts, in the same spool as the components to which they are welded. Surface mounted components are included in the spool if the fabrication type for the surface mounted component is set to "By Fabricator".

Delete Existing Spools

Changes the spool numbering only at modified or added piping. When a drawing is re-extracted, the software recalls the repeated data to avoid changing drawing split points and part, weld, and spool numbers.

This setting guarantees that the software applies the same piece marks (spool names) to spools, even if spools are regenerated.

Ignore Boundaries of Object Being Spooled

When set to **False**, the software will not cross the boundary of the pipeline or block. When set to **True**, the software will cross the boundary of the pipeline or block for spool generation until an intrinsic spool break is found. This feature is intended for use when spooling by block.

To use this option correctly, you need to understand the concept of intrinsic breaks. The spooling software starts a new spool any time it hits an intrinsic break:

- extent of the collection being spooled (pipeline or assembly)
- bolted connection
- (field) welded connection
- change in fabrication category from shop to field
- union (optional controlled by the Break Spools at Union option described previously)
- clamped connections

The extent of the collection being spooled is the most important intrinsic break condition. If a pipeline is spooled, the software breaks the spool at the end of the pipeline regardless of what is there. Normally, there is no conflict with the other intrinsic break conditions; however, a conflict can occasionally happen. For example, it does not matter if the pipeline is connected to another pipeline by a shop weld (which would normally not be a spool break), the software will still start a new spool at this point.

In listing the intrinsic breaks in order of importance, the extent of the collection being spooled should always be at the top because it normally trumps any other intrinsic break condition if a conflict arises. Whatever is being spooled, pipeline or block, is the "basket of

parts" with which the spool software works. The software does not go outside of that basket for any reason unless the **Ignore Boundaries of Object Being Spooled** is set to **True**. In that case, the spool software steals connected parts from outside of its basket until it hits an intrinsic break, an open end, or it runs out of parts. The spool software will not steal a part from outside the provided basket if that part already belongs to another spool.

TIP In other words, to turn off the first intrinsic break, set Ignore Boundaries of Object Being Spooled to True.

Maximum Spool Length

Provides the maximum length of a spool for oversizing calculation purposes. You should type **ft** (feet) for the units. If you specify units other than feet, the software uses meters as the units.

Maximum Spool Width

Provides the maximum width of a spool for oversizing calculation purposes. You should type **ft** (feet) for the units. If you specify units other than feet, the software uses meters as the units.

Maximum Spool Height

Provides the maximum height of a spool for oversizing calculation purposes. You should type **ft** (feet) for the units. If you specify units other than feet, the software uses meters as the units.

Spool Break By Control Point

Specifies if spools should break at control points.

You can place control points using the **Insert > Control Point** command. You must set the control point **Subtype** to **Spool Break** in order to use the control point with this option. In addition, the control point must be placed on the connection object.

TIP Use QuickPick to verify that you have selected the connection object when placing the control point for the spool break.



Click **Ignore Control Points** to ignore the control points during spooling. Click **Break at Control Points** to break spools at the normal intrinsic line breaks and at control points. Click **Break Only at Control Points** to break spools only at control points.

NOTE The software treats field welds as breaks. If you select **Break Only at Control Points**, the spool also breaks at field welds.

See Also

Generate Spools (on page 165) Spooling (on page 163) Delete a Spool (on page 166) Create Spools (on page 165)

Log Tab (Spool Generation Dialog Box)

Displays a log of the last pipe spooling process. You can save the log to a text file by clicking **Save Log**. The log is divided into four parts:

Before

Lists all the spools that existed in the model before you ran the last spooling process. This is the same list of spools that displays if you select this tab before processing spools.

To Do List

Lists spools that have objects in the **To Do List**. The spools cannot be created until you fix the objects on the **To Do List**. Click **View > To Do List** (or press CTRL+T) to view the **To Do List**.

Modified

Lists all the spools that were modified during the last spooling process.

New

Lists all the spools that were created during the last spooling process.

TIP You can select a spool, pipe, or pipe component in the list to highlight it in the model.

See Also

Generate Spools (on page 165) Spooling (on page 163) Delete a Spool (on page 166) Create Spools (on page 165)

Spool Properties Dialog Box

Displays information about a piping spool. You can create spools using the **Generate Spools** command.

See Also

Occurrence Tab (Spool Properties Dialog Box) (on page 170) Relationship Tab (on page 278) Configuration Tab (on page 269)

Occurrence Tab (Spool Properties Dialog Box)

Displays instance-specific information about the spool.

Category

Select the properties that you want to view for the object. Currently, only Standard properties are available for spools.

Standard

Displays all the occurrence properties for the spool as defined in the reference data.

Name

Specifies the name of the spool.

Name Rule

Displays how the object was named. If set to **Default Name Rule**, the software named the object using the default naming rule of <parent pipeline system> Spool<sequence number>. For example, 1001-P Spool1 is the first spool of pipeline system 1001-P. If set to User Defined, you, or someone else, named the object manually.

Sequence ID

Specifies the object sequence ID.

Spool Oversize Flag

Specifies whether the spool is oversized. The spool size is set on the Options Tab (Spool Generation Dialog Box) (on page 167).

True indicates that the spool is oversized.

False indicates that the spool is not oversized.

Create Penetration Spools

降 Creates penetration spools. This special type of spool consists of one or more spools connected with a penetration plate. There is a tight connection between the spools and the plate part using a penetration plate created in the Hangers and Supports task. You can view the penetration spools on the **Assembly** tab in the **Workspace Explorer**.

* IMPORTANT Before you can generate penetration spools, you must have at least one penetration plate in the model. Switch to the Hangers and Supports task and use the Place Support by Structure command. For more information about placing penetration plates in the model, see the Hangers and Supports User's Guide available from the Help > Printable Guides command in the software.

See Also

Penetration Spool Generation Dialog Box (on page 172) Penetration Spool Properties Dialog Box (on page 174)

Create penetration spools

* IMPORTANT Before you can generate penetration spools, you must have at least one penetration plate in the model. Switch to the Hangers and Supports task and use the Place Support by Structure command. For more information about placing penetration plates in the model, see the Hangers and Supports User's Guide available from the Help > Printable Guides command in the software.

- 1. On the vertical toolbar, click **Create Penetration Spools** ...

- Click the Spooling tab.
- Select a penetration plate for spooling.
- 4. Click OK.

■ NOTES

You must have one penetration plate only per pipeline system before penetration spooling can take place. If you have more than one plate connected to the pipe, the software displays an error message.

- After spooling, you can view the spools on the Assembly tab in the Workspace Explorer.
- To show spool identification numbers on an isometric drawing, set Drawing > Content > Show Spool ID to True in the Isometric Style Options Browser.

Penetration Spool Generation Dialog Box

Allows you to specify the penetration plate that you want to spool. You use this dialog box when generating penetration spools. The dialog box includes the following tabs:

Spooling Tab (on page 167)

Options Tab (Penetration Spool Generation Dialog Box) (on page 172)

Spooling Tab

Allows you to select the objects that you want to spool. For the **Generate Spools** command, you can choose pipeline systems, planning blocks, or WBS items. For the **Generate Penetration Spools** command, you can choose penetration plates.

If you spool by WBS items, two additional drop-down items for **WBS Item Type** and **WBS Item Purpose** appear on the **Spooling** tab. While you are not required to set these options before spooling, the drop-down options provide you with the ability to spool WBS items based on the type and purpose. For example, if you select a **WBS Item Type** of "Design Area" and a **WBS Item Purpose** of "Piping," the WBS items with this particular type and purpose are automatically selected in the tree view, allowing you to spool only these WBS items.

See Also

Generate Spools (on page 165) Spooling (on page 163) Delete a Spool (on page 166) Create Spools (on page 165)

Options Tab (Penetration Spool Generation Dialog Box)

Displays the spooling options to use. Each time you open the session file all spooling options default to the spool settings saved in the catalog. You can change the spooling options if needed for a special situation, but you cannot save your changes to the catalog or to the session file. The next time you open your session file, the spool options default to the catalog settings.

If you need to change the spooling options in the catalog, edit options on the **PipeMfgSpoolRule** sheet in the **BulkLoadIsoKeys.xIs** workbook and then bulkload the workbook into the catalog.

Name Rule

Specifies the naming rule for spools.

Break Spools at Union

Specifies that the software breaks the spools at unions. The union part must have its **Commodity Type** property set to "Union" for the spooling software to recognize the union as a break point.

Include Stub Ins with Header Spool

Specifies that a spool can include the stub-in pipe and all the parts of this stub-in branch

until the first spool-breaking component is encountered.

Include Items Welded to Pipe in Spools

Includes welded objects, such as pipe hanger or support parts, in the same spool as the components to which they are welded.

Delete Existing Spools

Changes the spool numbering only at modified or added piping. When a drawing is re-extracted, the software recalls the repeated data to avoid changing drawing split points and part, weld, and spool numbers. This setting guarantees that the software applies the same piece marks (spool names) to spools, even if spools are regenerated.

Ignore Boundaries of Object Being Spooled

When set to **False**, the software will not cross the boundary of the pipeline or block. When set to **True**, the software will cross the boundary of the pipeline or block for spool generation until an intrinsic spool break is found. This feature is intended for use when spooling by block.

To use this option correctly, you need to understand the concept of intrinsic breaks. The spooling software starts a new spool any time it hits one of the following intrinsic breaks:

- extent of the collection being spooled (pipeline or assembly)
- bolted connection
- (field) welded connection
- change in fabrication category from shop to field
- union (optional controlled by the Break Spools at Union option described above)
- clamped connections

The "extent of the collection being spooled" is the most important intrinsic break condition. If a pipeline is spooled, the software breaks the spool at the end of the pipeline regardless of what is there. Normally, there is no conflict with the other intrinsic break conditions; however, a conflict can occasionally happen.

For example, it does not matter if the pipeline is connected to another pipeline by a shop weld (which would normally not be a spool break); the software still starts a new spool at this point. In listing the intrinsic breaks in order of importance, the "extent of the collection being spooled" should always be at the top because it normally trumps any other intrinsic break condition if a conflict arises. Whatever is being spooled, pipeline or block, is the "basket of parts" that the spool software works with. The software does not go outside of that basket for any reason unless the **Ignore Boundaries of Object Being Spooled** is set to *True*. In that case, the spool software steals connected parts from outside of its basket until it hits an intrinsic break, an open end, or it runs out of parts. The spool software will not steal a part from outside the provided basket if that part already belongs to another spool.

TIP Setting Ignore Boundaries of Object Being Spooled to True, turns off the first intrinsic break rule from the previous list.

Maximum Spool Length

Provides the maximum length of a spool for oversizing calculation purposes. You should type **ft** (feet) for the units. If you specify units other than feet, the software uses meters as the units.

Maximum Spool Width

Provides the maximum width of a spool for oversizing calculation purposes. You should type **ft** (feet) for the units. If you specify units other than feet, the software uses meters as the units.

Maximum Spool Height

Provides the maximum height of a spool for oversizing calculation purposes. You should type **ft** (feet) for the units. If you specify units other than feet, the software uses meters as the units.

Spool Break By Control Point

Specifies if spools should break at control points. You can place control points using the **Insert > Control Point** command. You must insert the control point on the connection. You must also set the control point **Subtype** to **Spool Break** in order to use the control point with this option.

Click **Ignore Control Points** to ignore the control points during spooling. Click **Break at Control Points** to break spools at the normal intrinsic line breaks and at control points. Click **Break Only at Control Points** to break spools only at control points.

See Also

Generate Spools (on page 165) Spooling (on page 163) Delete a Spool (on page 166) Create Spools (on page 165)

Penetration Spool Properties Dialog Box

Displays information about a penetration spool. You create penetration spools using the **Create Penetration Spools** command.

Occurrence Tab (on page 272) Relationship Tab (on page 278) Configuration Tab (on page 269)

SECTION 12

Sequence Objects

Renames objects in the selected pipeline, pipe run, spool, or WBS item such that the names are in order. You can select to sequence the objects based on flow direction or topology.

Sequence Objects Ribbon

Sets options for sequencing names in a spool, pipeline, or pipe run.

Grouping/Sequencing Object Type

Select by what you want to sequence. You can select pipeline, pipe run, spool, or WBS item. This option defines the collection of target objects to be sequenced, and defines the boundaries of the sequencing.

Cancel

Reset the ribbon options.

Finish

Orders the object names using the options that you have set.

Target Object Type

Select what you want to re-sequence (rename) in the selected grouping.

Name Rule

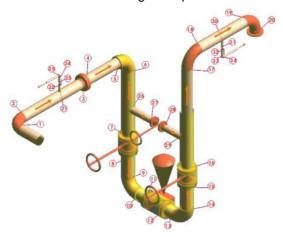
Select the naming rule to use to rename the target objects.

Sequencing Type

Defines the logical order to use to define the sequence number part of the name.

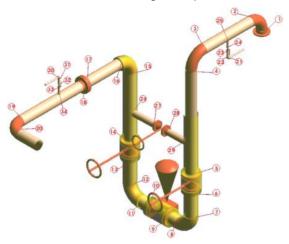
Flow Direction

Begin sequencing at the furthermost upstream point on the line and proceed along the line with the flow direction. Subsequent braches are then processed according to their flow direction. The following example shows weld sequencing when using flow direction.



Topology

Start from the point on the primary header of the spool, pipeline, or pipe run with the highest coordinate value and work back along the target objects until all have been processed. Subsequent branches are then processed from the furthermost point into the branch connection. The following example shows weld sequencing when using topology.



Revision Control

Specifies what to do with existing sequence number when you run the command again. Select **Retain existing numbers** to keep the sequence number on any objects that have one, but create a new sequence number for objects that do not have a sequence number. Select **Generate new numbers** to discard all sequence numbers for the selected object and generate new numbers for everything.

Start Sequence Id

Specifies the sequence ID from which you want to begin the sequence. This option is available only when **Generate new numbers** is selected.

What do you want to do?

- Sequence weld names in a pipeline (on page 176)
- Sequence weld names in a pipe run (on page 177)
- Sequence weld names in a spool (on page 177)
- Sequence weld names in a WBS item (on page 177)

Sequence weld names in a pipeline

- 1. Click **Sequence Objects** on the vertical toolbar.
- 2. In the Grouping/Sequencing Object Type box, select Pipeline.
- 3. Select one or more pipelines in the Workspace Explorer or in a graphics view.
- 4. In the Target Object Type box, select Pipe Weld.
- 5. In the **Sequencing Type** box, select how to sequence the welds.

6. Click Finish.

Sequence weld names in a pipe run

- 1. Click **Sequence Objects** If on the vertical toolbar.
- 2. In the Grouping/Sequencing Object Type box, select Pipe Run.
- 3. Select one or more pipe runs in the Workspace Explorer or in a graphics view.
- 4. In the Target Object Type box, select Pipe Weld.
- 5. In the **Sequencing Type** box, select how to sequence the welds.
- 6. Click Finish.

Sequence weld names in a spool

- 1. Click **Sequence Objects** if on the vertical toolbar.
- 2. In the Grouping/Sequencing Object Type box, select Spool.
- 3. Select the spool in the Workspace Explorer.
- 4. In the Target Object Type box, select Pipe Weld.
- 5. In the **Sequencing Type** box, select how to sequence the welds.
- 6. Click Finish.

Sequence Weld Names in a WBS Item

- 1. Click **Sequence Objects** If on the vertical toolbar.
- 2. In the Grouping/Sequencing Object Type box, select WBS Item.
- 3. Select the WBS item in the Workspace Explorer.
- 4. In the Target Object Type box, select Pipe Weld.
- 5. In the **Sequencing Type** box, select how to sequence the welds.
- 6. Click Finish.

SECTION 13

Group Pipe Parts

Automatically creates, names, and assigns piping objects to a Work Breakdown Structure (WBS) item. The WBS items can then be used to drive other operations in the software, such as Isometric drawings that are created from WBS items. You must claim all the objects to a WBS project before you can run this command on the objects.

Automated WBS Creation Dialog Box (on page 180)

What do you want to do?

- Grouping pipe parts by control points (on page 178)
- Grouping pipe parts by query and control points (on page 179)
- Grouping pipe parts by query (on page 179)

Grouping pipe parts by control points

- On the WBS tab of the Workspace Explorer, verify that you have a parent WBS item or WBS project to which to assign the generated WBS items. If you do not have a parent WBS project, see Create a Project.
- 2. Place the control points using the **Insert > Control Point** command. Be sure to select the correct control point subtype when placing the control points and that you place the control points on the piping connection objects. For more information, see Add Control Points.
- 3. On the vertical toolbar, click **Group Pipe Parts** 🖾.
- 4. Select the Options tab.
- Set WBS Automated Creation Rule Name to the WBS rule that you want to use. These
 rules are defined in the Catalog task under Piping > Piping Specification > Model Rules >
 WBS Creation Rule.
- 6. Set **WBS Item's Parent** to the WBS project or the WBS item that you created or identified in step 1.
- 7. Set **Discrimination Filter** to the filter that you want to use.
- 8. Review the remaining options and set as needed.
- 9. Click OK.
- 10. Select the Log tab.
- 11. Review the log. Click Save Log to save the log to a text file if needed.

■ NOTE After processing, you can view the WBS items on the WBS tab in the Workspace Explorer.

Grouping pipe parts by query and control points

- On the WBS tab of the Workspace Explorer, verify that you have a parent WBS item or WBS project to which you want to assign the generated WBS items. If you do not have a parent WBS project, see Create a Project.
- 2. Place the control points using the **Insert > Control Point** command. Be sure to select the correct control point subtype when placing the control points and that you place the control points on piping connection objects. For more information, see Add Control Points.
- 3. On the vertical toolbar, click **Group Pipe Parts** 🖭.
- 4. Select the **Options** tab.
- Set WBS Automated Creation Rule Name to the WBS rule that you want to use. These
 rules are defined in the Catalog task under Piping > Piping Specification > Model Rules >
 WBS Creation Rule.
- 6. Select the naming rule.
- 7. Set **WBS Item's Parent** to the WBS project or WBS item that you created or identified in step 1.
- 8. Set **Discrimination Filter** to the filter you want to use.
- 9. Set **Query Label** to the label that defines the query parameters and the naming rule to use in creating the WBS items if not already defined in the rule.
- 10. Review the remaining options and set as needed.
- 11. Click **OK**.
- 12. Select the Log tab.
- 13. Review the log. Click **Save Log** to save the log to a text file if needed.
- NOTE After processing, you can view the WBS items on the WBS tab in the Workspace Explorer.

Grouping pipe parts by query

- On the WBS tab of the Workspace Explorer, verify that you have a parent WBS item or the WBS project to which you want to assign the generated WBS items. If you do not have a parent WBS project, see Create a Project.
- 2. Use the **Tools > Select by Filter** command to define a filter to select the piping parts out of the model for the WBS items. You can use an existing filter if you have one. For more information, see Create a New Filter.
- 3. On the vertical toolbar, click **Group Pipe Parts** .
- 4. Select the Options tab.
- Set WBS Automated Creation Rule Name to the WBS rule that you want to use. These
 rules are defined in the Catalog task under Piping > Piping Specification > Model Rules >
 WBS Creation Rule.
- 6. Set WBS Grouping Rule Type to Group by query.

- 7. Set **WBS Item's Parent** to the WBS project or WBS item that you created or identified in step 1.
- 8. Set **Discrimination Filter** to the filter that you created or identified in step 2.
- 9. Set **Query Label** to the label that defines the query parameters and the naming rule to use in creating the WBS items if not already defined in the rule.
- 10. Review the remaining options and set as needed.
- 11. Click **OK**.
- 12. Select the Log tab.
- 13. Review the log. Click **Save Log** to save the log to a text file if needed.

■ NOTE After processing, you can view the WBS items on the WBS tab in the Workspace Explorer.

Automated WBS Creation Dialog Box

Allows you to specify the objects that you want to process.

OK

Processes the piping parts for WBS assignment using the defined options.

Cancel

Exits the dialog box.

Save Log

Saves the information on the **Log** tab to a text file.

See Also

Group Pipe Parts (on page 178)
Log Tab (Automated WBS Creation Dialog Box) (on page 182)
Options Tab (Automated WBS Creation Dialog Box) (on page 180)

Options Tab (Automated WBS Creation Dialog Box)

Specifies the options to use when using the automatic WBS item generation.

WBS Automated Creation Rule Name

Select the WBS creation rule to use. You can create new rules and edit existing rules in the Catalog task under **Piping > Piping Specification > Model Rules > WBS Creation Rule**.

Name Rule

Select the name rule to use.

WBS Grouping Type

Displays the grouping type. This field is read-only. You need to edit the WBS rule in the Catalog task if you want to use a different grouping type for this rule.

Create Exclusive WBS Item

True indicates that the WBS items that are being created are exclusive. **False** indicates that the WBS items are not exclusive. This field is read-only. You need to edit the WBS rule in

the Catalog task if you want to change this setting.

Query Label

Select the label that defines the query parameters to use in creating the WBS items. If the Label Name Rule is selected as the **Name Rule** option, then the **Query Label** also defines the naming convention used when creating WBS items.

Discrimination Filter

Select the filter is use to select the piping parts for the WBS item. The filter can return any group of objects, but only pipe parts are used.

WBS Item's Parent

Select the parent WBS project or WBS item.

★ IMPORTANT The pipe parts must have been previously claimed to the WBS project.

WBS Grouping Rule Type

Displays how the software selects objects for the WBS items. This field is read-only. You need to edit the WBS rule in the Catalog task if you want to use a different grouping rule type for this rule.

- Group by query Objects are grouped based upon a query that is defined in a label. For example, use this option to quickly find all pipe parts that belong to run that are heat traced and then to subgroup them according to other attributes such as sequence number, NPD, and so forth.
- Group by query and control point Objects are grouped based on queries and control
 points. By using this method, you can group objects using the query, and then create
 subgroups using the placement of control points.
- Group by control point Objects are grouped based on control points that you place using the Insert > Control Point command. Objects between the control points are grouped together. If this option is used, the control point subtype that is used is displayed in the Control Point Subtype field.

Control Point Subtype

Displays the control point subtype the command is to look for. The control points are used as boundaries to define where one WBS item grouping ends and the next one begins. You place the control points using the **Insert > Control Point** command. Be sure that when you are placing the control points that you select the correct control point subtype and that you place the control point on the piping connection object. This field is read-only. You need to edit the WBS rule in the Catalog task if you want to use a different subtype for this rule.

Maximum Number of Objects

Specifies the maximum number of objects to put in a WBS item. When this limit is exceeded, the software logs a warning in the log file.

Pull in Associated Items

Specify what associated items you want included in the WBS item.

- None Does not include any associated parts in the WBS item.
- Connection and Reportable Connection items and reportable parts are included in the WBS item. Examples of these related parts would be gaskets, bolt and nut sets, and welds.

- Supports, Connection and Reportable Pipe Supports and the connection and reportable parts are included in the WBS Item.
- Pipe support only Only pipe supports are included in the WBS item.

Maintain Existing WBS Items?

Select **True** to have the software change existing WBS items only when absolutely necessary. Select **False** to allow the software to delete any existing WBS items and replace them with new items.

When you add or remove components from a WBS item, the software tries to minimize the impact to existing WBS items. The change management goals are:

- Inserting a part into a pipeline causes no impact to existing WBS items except for the part being added to the appropriate WBS item unless the query mandates the creation of a previously non- existent WBS item.
- Deleting a part from a pipeline causes no impact to the existing WBS Items except for the part being removed from the appropriate WBS Item.
- Parts which have been previously assigned to a WBS Item will always remain associated to that same WBS Item (based on the object ID) where possible.

In some cases, some goals may only be partially enforced or may not be enforceable at all. The level of success in meeting these goals is highly dependent upon how much the piping design has changed since the command was last run.

Log Tab (Automated WBS Creation Dialog Box)

Displays a log of the last WBS item generation process. You can save the log to a text file by clicking **Save Log**. The log is divided into four parts:

Before

Lists all the WBS items that existed in the model before you ran the last process. This is the same list of WBS items that displays if you select this tab before processing.

To Do List

Lists WBS items that have been sent to the **To Do List**. You must fix the WBS items on the **To Do List**. Click **View > To Do List** (or press CTRL+T) to view the **To Do List**.

Modified

Lists all the WBS items that were modified during the last process.

New

Lists all the WBS items that were created during the last process.

SECTION 14

Route Flex Pipe

Places a flexible pipe between two nozzles or ports that you identify. The two nozzles/ports must be either:

- Parallel and facing each other but at different elevations, or
- At an angle to each other, but the center-lines are co-planar.

Limitations

- You cannot modify the individual parts for the flex pipe. You must edit the flex pipe feature as a whole run.
- You cannot split flex pipe.
- You cannot place components in a flex pipe.

Route Flex Pipe Ribbon

Sets options for routing flexible pipe.

Pipe Properties

Opens the **Pipe Properties** dialog box in which you can define additional properties that are not available on the ribbon bar. For more information, see *New Pipe Run Dialog Box* (on page 85).

T Start Point

Select the starting pipe end feature, pipe port, or equipment nozzle.

🛂 End Point

Select the terminating pipe end feature, pipe port, or equipment nozzle.

Run

Displays existing pipe runs along with the <New Pipe Run>, <New/Continue Run>, <Select from P&ID>, and More options. Select the pipe run to route or select <New Pipe Run> to create a new pipe run to route. If a new pipe run is created, all runs associated with the parent pipeline selected on the New Pipe Run dialog box appear in the list.

Select **<New/Continue Run>** to automatically extend an existing pipe run by selecting the end feature of that pipe run. If a run is continued, all runs associated with the pipeline parent of the continued run appear in the list. If you do not select an end feature, the **New Pipe Run** dialog box automatically activates to create a pipe run. For more information, see *New Pipe Run Dialog Box* (on page 85).

Select **<Select from P&ID>** to graphically select a run in a P&ID to route. When you select the run in the P&ID, the software checks to see if the run already exists in the Smart 3D model. If the run does exist, the current run is set to that run. If the run does not exist, the **New Pipe Run** dialog box displays using values from the run that you selected in the P&ID as the defaults. When you click **OK**, the run is created, and then correlated to the run in the P&ID.

Select **More** to select a pipe run that is associated with a different pipeline parent. For more information, see *Select Pipe Run Dialog Box* (on page 98).

Assembly Tag

Select the connection option for the flexible pipe.

Assembly Option

Select the assembly option.

Finish

Places the flexible pipe using the parameters that you have specified.

Angle

Displays the angle of the flex hose.

Bend Radius

Displays the bend radius of the flex hose.

What do you want to do?

- Route a flexible pipe (on page 184)
- Route a flexible pipe from a P&ID run (on page 185)

Route a flexible pipe

- 1. Click Route Flex Pipe on the vertical toolbar.
- 2. Select the run starting point.

TIPS

- If you select an equipment nozzle, the software prompts you to create a new pipe run.
- If you select an equipment nozzle that is correlated with P&ID design basis data, the software automatically determines which run should be connected.
- 3. On the **New Flex Pipe Run** dialog box, type a name. If you do not specify a name, the software automatically generates a name.

Select Pipe Run Settings (on page 78) New Pipe Run Dialog Box (on page 85)

- 4. Click **OK** to close the **New Flex Pipe Run** dialog box.
- 5. Select the ending point of the flexible pipe.

■ NOTE

If the piping specification that you selected has service limits defined, you must define at least one temperature value and one pressure value for the pipe run. Do this by selecting Temperature and Pressure from the Category option.

Route a flexible pipe from a P&ID run

NOTE Your plant must be registered with the Smart 3D environment to use this procedure.

- 1. Click **SmartPlant > Retrieve** to retrieve the P&ID drawing that contains the run that you want to route. You can skip this step if the P&ID has already been retrieved.
- Click SmartPlant > View P&ID to view the P&ID drawing that contains the run that you want to route.
- 3. Click **Route Flex Pipe** on the vertical toolbar.
- 4. In the Run pull-down list on the ribbon bar, select <Select from P&ID>.
- 5. Select the run to route from the P&ID drawing.
- The New Flex Pipe Run dialog box appears with properties populated from the design basis. Click OK to accept the properties given. This step saves the correlated run information and closes the New Flex Pipe Run dialog box.
- 7. Select the starting location of the flexible pipe.

TIPS

- If process data was not defined on the P&ID, then you must manually type a temperature and pressure.
- If you select an equipment nozzle that is correlated with P&ID design basis data, the software automatically determines which run should be connected.
- 8. Select the ending location of the flexible pipe.

SECTION 15

Quick Route

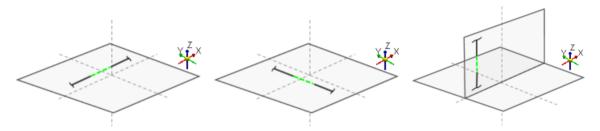
Joins two existing pipe segments in the model. You can connect the pipe segments by selecting an end feature, a nozzle, a straight feature, or a surface mounted component. The software displays all possible orthogonal route paths and the direct route path between the selected *from* and *to* points.

Path Options

The software displays only the applicable path options based on the location and orientation of the selected end points in the model. The default option is **Join Direct**. The software remembers the last used path and sets it as the default option for the next operation. However, if the last used path is not applicable, the default option is reverted to **Join Direct**.

* IMPORTANT The software always computes the paths along the active co-ordinate axes.

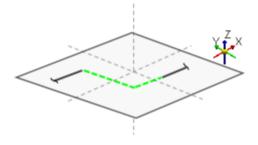
Same axis: If both *from* and *to* end points lie along the same axis, then the software displays only **Join Direct** .



Same plane: If the *from* and *to* end points exist in the same plane, then the software displays the following options:

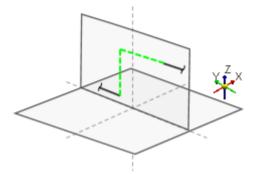
XY Plane:





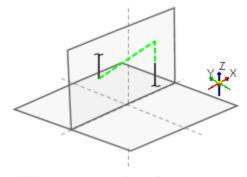
YZ Plane:





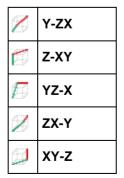
ZX Plane:

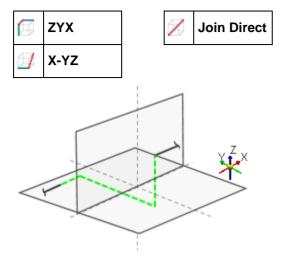




Different planes: If the *from* and *to* end points exist in different planes, then the software displays the following options:





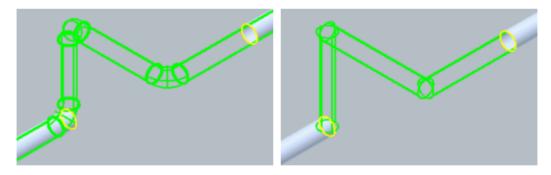


Minimum Distance Between End Points

Make sure to maintain a minimum distance between the two end points along each axis to avoid skews. The distance between the *from* and *to* end points should facilitate proper placement of the turn features. Insufficient distance might cause skews. The minimum distance is based on the dimensions of the selected route objects.

Fast Compute

In fast compute mode, the elbows or turns compute graphics are not rendered while in dynamic display. By default, the software does not use fast compute mode to dynamically display the compute graphics.



Fast Compute turned off

Fast Compute turned on

Navigating the Path Options

When you hover the mouse on a path option, the software dynamically displays the compute graphics for that path option. You can also press Tab or use the mouse scroll-wheel to navigate across the path options. Alternatively, you can also use the arrow keys to navigate. As you navigate, the software dynamically updates and displays the graphics.

Quick Route Ribbon

Join From

Specifies the starting end point.

Join To

Specifies the terminating end point.

✓ Path Options

Displays all possible route path options to join the two end points. The first path option displayed on the menu is the default option.

- ★ IMPORTANT The software always computes the paths along the active co-ordinate axes.
- Join Direct Joins the from and to end points directly with a one-segment run, irrespective of the axes.
- **XY** Joins the *from* and *to* end points with the first segment run along the X-axis (E-axis), and then with the second segment along the Y-axis (N-axis).
- YX Joins the from and to end points with the first segment run along the Y-axis, and then with the second segment along the X-axis.
- YZ Joins the *from* and *to* end points with the first segment run along the Y-axis, and then with the second segment along the Z-axis (El-axis).
- ZY Joins the from and to end points with the first segment run along the Z-axis, and then with the second segment along the Y-axis.
- XZ Joins the from and to end points with the first segment run along the X-axis, and then with the second segment along the Z-axis.
- **ZX** Joins the *from* and *to* end points with the first segment run along the Z-axis, and then with the second segment along the X-axis.
- X-YZ Joins the from and to end points with the first segment run along the X-axis, and then with the second segment along the YZ plane.
- Y-ZX Joins the from and to end points with the first segment run along the Y-axis, and then with the second segment along the ZX plane.
- **Z-XY** Joins the *from* and *to* end points with the first segment run along the Z-axis, and then with the second segment along the XY plane.
- **YZ-X** Joins the *from* and *to* end points with the first segment run along the YZ plane, and then with the second segment along the X-axis.
- **ZX-Y** Joins the *from* and *to* end points with the first segment run along the ZX plane, and then with the second segment along the Y-axis.
- **XY-Z** Joins the *from* and *to* end points with the first segment run along the XY-axis, and then with the second segment along the Z-axis.

- **XYZ** Joins the *from* and *to* end points with the first segment run along the X-axis, the second segment run along the Y-axis, and the third segment run along the Z-axis.
- **XZY** Joins the *from* and *to* end points with the first segment run along the X-axis, the second segment run along the Z-axis, and the third segment run along the Y-axis.
- YZX Joins the *from* and *to* end points with the first segment run along the Y-axis, the second segment run along the Z-axis, and the third segment run along the X-axis.
- YXZ Joins the *from* and *to* end points with the first segment run along the Y-axis, the second segment run along the X-axis, and the third segment run along the Z-axis.
- ZXY Joins the from and to end points with the first segment run along the Z-axis, the second segment run along the X-axis, and the third segment run along the Y-axis.
- **ZYX** Joins the *from* and *to* end points with the first segment run along the Z-axis, the second segment run along the Y-axis, and the third segment run along the X-axis.

Finish

Places a run along the selected route path.

Run

Displays existing pipe runs along with the <New Pipe Run>, <New/Continue Run>, <Select Graphically>, and More options.

- New Pipe Run Displays the New Pipe Run dialog box. Use this option to create a new pipe run to route. If a new pipe run is created, all runs associated with the parent pipeline selected on the New Pipe Run dialog box display in the list. For more information, see New Pipe Run Dialog Box (on page 85).
- New/Continue Run> Extends an existing pipe run if you select the end feature of that pipe run. If a run is continued, all runs associated with the pipeline parent of the continued run display in the list. If you do not select an end feature, the New Pipe Run dialog box displays to create a new pipe run. For more information, see New Pipe Run Dialog Box (on page 85).
- <Select Graphically> Selects an existing pipe run in a graphic view, or the Workspace Explorer.
- More Displays the Select Pipe Run dialog box. Use this option to select a pipe run
 that is associated with a different pipeline parent. For more information, see Select Pipe
 Run Dialog Box (on page 98).

Turn Option

Select the option code associated with the turn component that you want to use while routing. Only those option codes defined in the controlling piping specification and shared by all of the short codes that can be placed automatically while routing appear. Only the options available for all short codes available during routing are listed. If pipe spec writer only added a second choice for 90 degree direction change, then route would not display it in the drop down list.

Straight Option

Select the option code associated with the pipe that you want to use while routing. Only those option codes defined in the controlling piping specification appear.

Fast Compute

Specifies whether or not the software must render complete compute graphics.

What do you want to do?

- Join two existing pipe runs (on page 191)
- Join two existing pipe runs at a branch point (on page 192)
- Join a pipe run from a nozzle or port (on page 192)
- Join a pipe run from a nozzle or port at a branch point (on page 194)

Join two existing pipe runs

- 1. Click Quick Route | on the vertical toolbar.
- 2. Select an end feature or a nozzle from which to extend the pipe run.
- 3. Select a terminating end feature or a nozzle.

The software displays all possible path options based on the location of the selected features. You can navigate through the path options and view the dynamic compute graphics.

- 4. On the **Path Options** ** menu, select an option that you want. You can click the option or press Enter to confirm your selection.
 - NOTE By default, the software considers the highlighted option as your selection.
- 5. If necessary, select an appropriate run from the **Run** drop-down list, or proceed to Step 6.
 - Select <Select Graphically> to select an existing run in a graphic view or in the Workspace Explorer.
 - Select <New Pipe Run> to create a new pipe run to route. For more information, see New Pipe Run Dialog Box (on page 85).
 - Select More... to select a pipe run that is associated with a different pipeline parent. For more information, see Select Pipe Run Dialog Box (on page 98).
- 6. Click Finish.

The software joins the two end points along the selected path.

- **WARNING** If the selected path results in skews, then the software prompts you with a warning message.
- a. Click **No** to undo the current path selection.
- b. Select another path option, and then click Finish.
- 7. Continue quick routing, or right-click to exit the command.

See Also

Join a pipe run from a nozzle or port (on page 192)

Join two existing pipe runs at a branch point

- 1. Click Quick Route \(\big| \) on the vertical toolbar.
- 2. Select an end feature or a nozzle from which to extend the pipe run.
- 3. Select a terminating straight feature or header run.

The software displays all possible path options based on the location of the selected features. You can navigate through the path options and view the dynamic compute graphics.

- 4. On the **Path Options** menu, select an option that you want. You can click the option or press Enter to confirm your selection.
 - **NOTE** By default, the software considers the highlighted option as your selection.
- 5. If necessary, select an appropriate run from the Run drop-down list, or proceed to Step 6.
 - Select <Select Graphically> to select an existing run in a graphic view or in the Workspace Explorer.
 - Select <New Pipe Run> to create a new pipe run to route. For more information, see New Pipe Run Dialog Box (on page 85).
 - Select More... to select a pipe run that is associated with a different pipeline parent. For more information, see Select Pipe Run Dialog Box (on page 98).
- 6. Click Finish.

The software joins the two end points along the selected path.

- WARNING If the selected path results in skews, then the software prompts you with a warning message.
- a. Click No to undo the current path selection.
- b. Select another path option, and then click **Finish**.
- 7. Continue quick routing, or right-click to exit the command.

See Also

Join a pipe run from a nozzle or port at a branch point (on page 194)

Join a pipe run from a nozzle or port

- 1. Click Quick Route | on the vertical toolbar.
- 2. Select a nozzle or port from which to extend the pipe run.



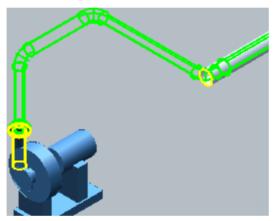
The software displays the **New Pipe Run** dialog box. For more information, see New Pipe Run Dialog Box (on page 85).

- 3. Select a pipe run, and if necessary, specify required properties.
- 4. Select a terminating end feature or a nozzle.



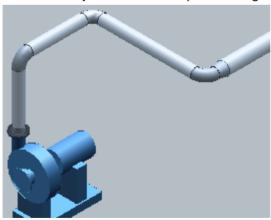
The software displays all possible path options based on the location of the selected features. You can navigate through the path options and view the dynamic compute graphics.

- 5. On the **Path Options** wenu, select an option that you want. You can click the option or press Enter to confirm your selection.
 - **NOTE** By default, the software considers the highlighted option as your selection.



Click Finish.

The software joins the two end points along the selected path.



WARNING If the selected path results in skews, then the software prompts you with a warning message.

- a. Click No to undo the current path selection.
- b. Select another path option, and then click **Finish**.
- 7. Continue quick routing, or right-click to exit the command.

See Also

Join two existing pipe runs (on page 191)

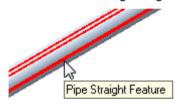
Join a pipe run from a nozzle or port at a branch point

- 1. Click Quick Route | on the vertical toolbar.
- 2. Select a nozzle or port from which to extend the pipe run.



The software displays the **New Pipe Run** dialog box. For more information, see New Pipe Run Dialog Box (on page 85).

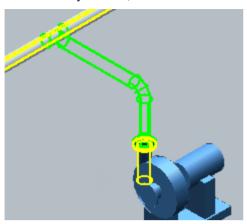
- 3. Select a pipe run, and if necessary, specify required properties.
- 4. Select a terminating straight feature.



The software displays all possible path options based on the location of the selected features. You can navigate through the path options and view the dynamic compute graphics.

5. On the **Path Options** * menu, select an option that you want. You can click the option or press Enter to confirm your selection.





6. Click Finish.

The software joins the two end points along the selected path.



- **WARNING** If the selected path results in skews, then the software prompts you with a warning message.
- a. Click No to undo the current path selection.
- b. Select another path option, and then click **Finish**.
- 7. Continue quick routing, or right-click to exit the command.

See Also

Join a pipe run from a nozzle or port (on page 192)

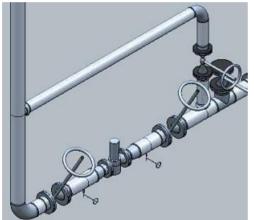
SECTION 16

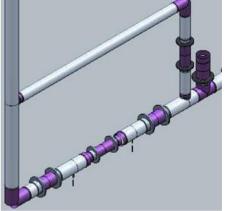
Generic Piping Component

If the destination catalog is missing certain component specification data during MDR or when you copy a model across different catalogs, the software replaces such components with pseudo parts called Generic Piping Components (GPCs). GPCs help maintain the piping design intent.

The software creates a GPC if the destination catalog is missing any of the following data:

- Short code
- Part number
- Instruments and piping specialties tag
- ProgID or symbol DLL





Actual parts in the source model

Generic Piping Components in destination model with missing part

NOTE GPCs are not created for mating parts.

The GPCs are named as Replace Me [ShortCode or Tag] in the **Workspace Explorer**. The short code and tag are stored from the source model.



The software stores the following data if a matching component exists in the destination catalog:

- Dimensional data
- Port connection data

- Attributes that are required to convert a GPC into the required part
- Custom attributes, if they are available in the destination catalog.

S.No.	Attributes
1	Component Type
2	Commodity Class
3	Commodity Sub Class
4	Commodity Type
5	Contractor Commodity Code
6	End Preparation
7	End Standard
8	Fabrication Type
9	Face to Face distance
10	Face to Center distance
11	Face1 to Center distance
12	Face2 to Center distance
13	Geometry Type
14	Option Code
15	Largest Port Diameter
16	Long Material Description
17	Nominal Pipe Diameter
18	Schedule/Thickness
19	Short Material Description
20	Short Code
21	Tag Number (if the component is tagged)

Generic Piping Component Ribbon



Activates the properties dialog box of the selected part.

Run

Displays the name of the associated parent pipe run.

Type

Displays the associated source short code. You can select a different component type with the following options:

- Corresponding component short codes. You need to bulk load missing data, if the corresponding short codes are not listed.
- Specify Component Tag> Displays the Specify Component Tag dialog box to select a component tag from the catalog or the Design Basis. For more information, refer Specify Component Tag Dialog Box (on page 96).
- Browse custom instruments Displays the Browse custom instruments dialog box to select a different component from the catalog. For more information, refer Browse custom instruments Dialog Box (on page 153).
- Browse piping custom specialties Displays the Browse piping custom specialties
 dialog box to select a different component from the catalog. For more information, refer
 Browse piping custom specialties Dialog Box (on page 153).

Option

Displays the options available for the selected object.

Name

Displays [ShortCode or Tag] of the generic piping component.

Tag

Displays the engineering tag if the source component was tagged.

Base/Mating Part

Displays whether the selected object is a base part or a mating part.

Modify Generic Piping Component Ribbon



Activates the properties dialog box of the selected feature.

Move From

Specifies the start point for move. If you do not specify a starting point, the software assumes the current location of the feature as the starting point.

Move To

Specifies the end point for move.

Plane

Displays all available working plane options.

- Plan Plane Defines the work surface as the XY plane at the depth of the active end. You also can press CTRL+1 to select this option.
- Elevation Plane: East-West Defines the work surface as the XZ plane. You also can press CTRL+2 to select this option.

- **Elevation Plane: North-South** Defines the work surface as the YZ plane. You also can press CTRL+3 to select this option.
- Plane by Turn/Branch Defines the work surface as the plane defined by an existing turn or branch. You select the turn or branch to set the plane. You also can press CTRL+4 to select this option.
- Plane by Three Points Defines the work surface using three points that you define. You also can press CTRL+5 to select this option.
- No Plane Clears any work surfaces. The software does not project points that you place to any plane. You also can press CTRL+6 to select this option.

Run

Displays the name of the associated pipe run. Also displays all pipe runs associated with the pipeline parent.

- You can select a different pipe run from the list, if necessary.
- Select <New Pipe Run> to create a new pipe run to route.
- Select <Select Graphically> to select an existing pipe run in a graphic view, the Workspace Explorer, or the P&ID View.
- Select More to select a pipe run associated with a different pipeline.

Type

Displays the associated source short code. You can select a different component type with the following options:

- Corresponding component short codes. You need to bulk load missing data, if the corresponding short codes are not listed.
- Specify Component Tag> Displays the Specify Component Tag dialog box to select a component tag from the catalog or the Design Basis. For more information, refer Specify Component Tag Dialog Box (on page 96).
- Browse custom instruments Displays the Browse custom instruments dialog box to select a different component from the catalog. For more information, refer *Browse* custom instruments Dialog Box (on page 153).
- Browse piping custom specialties Displays the Browse piping custom specialties
 dialog box to select a different component from the catalog. For more information, refer
 Browse piping custom specialties Dialog Box (on page 153).

Option

NOTE This option is read-only for generic piping component.

Displays the options available for the selected object. For example, if two different wall thickness values are available in the piping specification for the short code selected in the **Type** box, both options appear in this list. Selecting a value from the **Option** list updates the object accordingly.

₩ Flip

NOTE This option is read-only for generic piping component.

Orients the turn so that the other turn port is connected to the end of the run. This option is available only when a turn is connected to the end of a run and no other part has been

connected to the other turn port.

A Rotate

NOTE This option is read-only for generic piping component.

Select to rotate the component about the pipe interactively. This option is available only for pipe parts.

Angle

NOTE This option is read-only for generic piping component.

Type an angle at which you want the component rotated about the pipe. This option is available only for pipe parts.

5 Lock Angle

NOTE This option is read-only for generic piping component.

Locks or unlocks the **Angle 2** and **Angle 3** boxes. Locking the corresponding angle value creates a constraint along which the selected turn angle can be moved. This option is only available for turn features.

Angle 2

NOTE This option is read-only for generic piping component.

Specifies the angle of the turn feature located at the end of one associated leg. If this box is blank, there is no turn feature located at the end of the leg. When you select this box, the software highlights the **Angle 2** turn feature in the model. Although this value can be changed, the location of the corresponding turn cannot. Modification of this value repositions the selected turn until the specified angle is achieved. This option is only available for turn features.

Angle 1

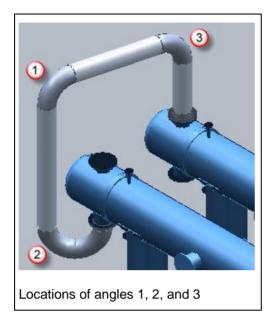
NOTE This option is read-only for generic piping component.

Specifies the angle of the turn that you are editing. Modification of this value repositions the selected turn until the specified angle is achieved. This option is only available for turn features.

Angle 3

NOTE This option is read-only for generic piping component.

Specifies the angle of the turn feature located at the end of one associated leg. If this box is blank, there is no turn feature located at the end of the leg. When you select this box, the software highlights the **Angle 2** turn feature in the model. Although this value can be changed, the location of the corresponding turn cannot. Modification of this value repositions the selected turn until the specified angle is achieved. This option is only available for turn features.



Offset

NOTE This option is read-only for generic piping component.

Controls the SmartSketch offset constraint. Type the distance that you want to offset the pipe that you are routing. Select **<Disabled>** if you do not want to use the offset constraint to help route the pipe. Select **Set Offset Reference** to define the reference point. This option is available only for turn features.

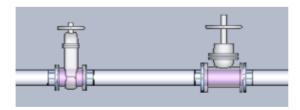
Modify Slope

NOTE This option is read-only for generic piping component.

Activates the **Modify Slope** dialog box, with which you can modify the slope of the legs on either side of the selected turn. This command is available only for sloped pipes.

Replacing Generic Piping Component

You can replace a GPC with the required part using the short code, catalog part, or tag. If the destination catalog does not have the component, then the software only stores the component's Type information. When you replace a GPC, the orientation and the position of that part or component is maintained with respect to the source part or component.



Source components superimposed on generic piping components

Replace a Generic Piping Component (on page 203)

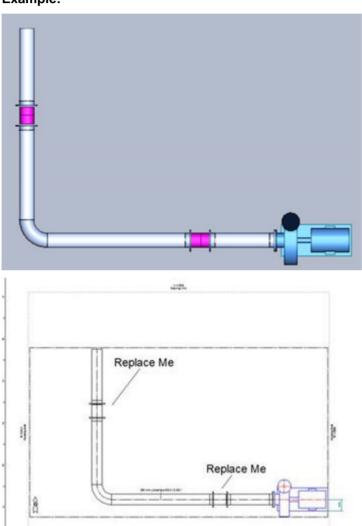
Interference Checking

You can generate an IFC report for a piping network with GPCs based on their Simple Physical Aspect.

Generate Composed Drawings and Reports

You can generate composed drawings and reports of the piping network that has generic piping components.

Example:

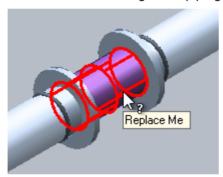


Limitations

- GPC does not support name rule, but supports named items.
- You cannot generate spools and assembly items of a pipe run that has GPCs.
- GPCs are not included in WBS items, but are included in a WBS project.
- The software only stores the Weight and CG values from the source model. A GPC does not support the Weight and CG, as it is not associated with any catalog part.
- You cannot route from a GPC because GPCs do not have end features. You can route from an olet to a GPC.
- You cannot generate isometric drawings of a piping network if it has generic piping components.

Replace a Generic Piping Component

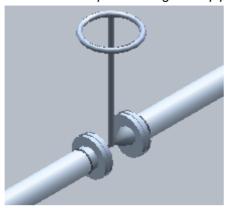
- 1. From the Locate Filter, select Piping Features or Piping Parts.
- 2. Locate and select the generic piping component to replace.



3. On the ribbon bar, select the required part from **Type** or browse the catalog.



The software replaces the generic piping component with the selected component.



TIP You can replace multiple GPCs of the same type only from the corresponding Properties dialog box > **General Tab** > **Type** property. However, you cannot multi-replace a GPC that was converted using a piping instrument and specialties tag.

Occurrence Tab (Pipe Generic Occ Properties)

Displays and defines the general properties of the selected generic piping component.

Generic piping component properties are divided into different categories: **Standard**, **Fabrication and Construction**, and **Weight and CG**. You can use the **Category** option to select a category for which you want to define values.

Standard

Name

Displays the name of the generic piping component. Replace Me [<short code or tag>].

Pipe run

Displays the name of the parent pipe run to which the generic piping component belongs to.

Type

Displays the object's short code. The list of available short codes is based on the piping specification and nominal diameter of the object selected along with the geometry at the insertion location.

Option

Displays a list of options that you can use instead of the selected object. If no options exist, this field just displays **Default**. The **Option** list contains any options defined in the piping specification for the short code selected in the **Type** list. For example, if you are looking at a valve part, the **Option** list contains other valve parts, such as one with a higher pressure rating, that you can use here. Selecting a value from the **Option** list updates the object.

Tag

Displays the engineering tag if it is a tagged component.

Base/Mating Part

Displays whether the selected object is a base part or a mating part. If the object is a mating

part, you can use this option to change the object to a base part. Use caution however, because after a mating part has been changed to a base part, it cannot be changed back to a mating part again.

Component Type

Displays the commodity type short code for the generic piping component.

PartClassName

Displays the part class name of the generic piping component.

ContractorCommodityCode

Displays the commodity code of the source component.

ShortMaterialDescription

Displays the material description of the source component.

LongMaterialDescription

Displays the material description of the source component.

CommodityClass

Displays the commodity class of the source component.

CommoditySubClass

Displays the commodity sub class of the source component.

CommodityType

Displays the source component commodity type. Valid codes and short descriptions are listed in the **AllCodeLists.xls** workbook on the **PipingCommodityType** sheet in the **Codelist Number** column.

Maximum Outer Diameter

Displays the component's maximum outer diameter for the piping port.

GeometryType

Displays the geometry type code for the generic piping. Valid codes are listed in the **AllCodeLists.xls** workbook on the **GeometryType** sheet in the **Codelist Number** column.

Reporting Requirement

Select the reporting requirements for the object. You can specify that the object is reported or not reported. An example of an object that you may not want reported is a spacer for a valve. You have to order the valve, but the spacer comes with the valve and does not need to be ordered.

Reporting Type

Select the reporting type. The options that are available here depend on what you select for the **Reporting Requirement**.

Face to Face

Displays the distance from the port 1 face to the port 2 face.

Face to Center

Displays the distance from the face of the port to the center of the part.

Face 1 to Center

Displays the length from the port 1 face to center of the component.

Face 2 to Center

Displays the length from the port 2 face to center of the component.

Branch Reporting Ownership Type Basis

Specifies who set the branch reporting ownership. This could be a user or Smart 3D. This option is used by the software when an administrator synchronizes the model with the catalog. The list is defined by the FabricationTypeBasis codelist.

Fabrication and Construction

Fabrication Requirement

Specifies the fabrication requirement for the object. To change the options on the list, edit the **Fabrication Type** select list in Catalog.

Fabrication Type

Specifies the type of fabrication for the object. To change the options on the list, edit the **Fabrication Type** select list in Catalog.

Construction Requirement

Specifies the construction requirement for the object. To change the options on the list, edit the **Construction Requirement** select list in Catalog.

Construction Type

Specifies the type of construction for the object. To change the options on the list, edit the **Construction Type** select list in Catalog.

Weight and CG

Displays the center-of-gravity and the weight of the selected object. The center-of-gravity locations are displayed relative to the active coordinate system along the X-, Y-, and Z-axes. The weight value that is displayed in the properties dialog box is calculated as the material density multiplied by the object's solid volume. Therefore, the material of the object affects the weight value that is displayed here. Check the material assigned to the object if the weight displayed is an improbable value. For the most accurate weight calculation, use the **Tools > Run Reports** command.

Dry Weight

Specifies the dry weight of the object.

Wet Weight

Specifies the wet weight of the object.

NOTE The **Wet Weight** is the sum of **Dry Weight** and the weight of the fluid inside a piping object. The dry weight and fluid weight values are catalog values entered on the part sheet for the object.

Dry CG X

Specifies the X-axis location of the dry center-of-gravity.

Dry CG Y

Specifies the Y-axis location of the dry center-of-gravity.

Dry CG Z

Specifies the Z-axis location of the dry center-of-gravity.

Wet CG X

Specifies the X-axis location of the wet center-of-gravity.

Wet CG Y

Specifies the Y-axis location of the wet center-of-gravity.

Wet CG Z

Specifies the Z-axis location of the wet center-of-gravity.

See Also

Relationship Tab (on page 278) Configuration Tab (on page 269) Notes Tab (on page 271)

SECTION 17

Disconnect

Tools > Utilities > Disconnect (CTRL+ALT+D)

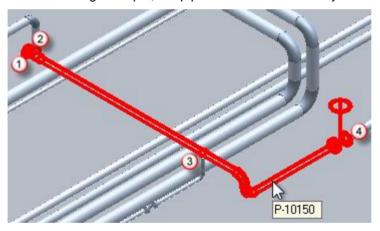
Use this command to disconnect a section of route network, and modify its topology without disturbing the rest of the network. The software disconnects the selection at boundary connections, and deletes any mating parts and transitions at the boundaries. The software also removes all the relationships of the selection with the rest of the network.

We recommend that you reconnect objects after modifying the selection, to avoid topological errors.

You can disconnect the following route objects:

- a pipeline
- a pipe run
- a set of features
- a feature such as a turn feature, a component type along-leg feature, or a straight feature.

In the following example, the pipeline has four boundary connections:



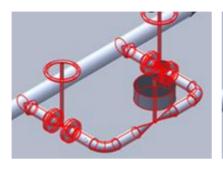
Permission Group (PG), Approval Status, and Global Workshare Conditions

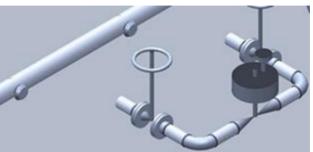
If you select route objects that belong to a permission group (PG) to which you have full control permission, the software disconnects the selected objects at boundary connections. You can also disconnect at a PG boundary connection if you do not have access to one side of the connection. But, you must have full control permissions to the objects that you select for disconnection.

If an object at the other end of the boundary connection is in a non-working approval state, the software generates a To Do Record for that object. Also, the software generates a To Do Record if the non-working object is in a different workshare location.

Olets

When you disconnect a branch at an olet, the olet remains with the header. The software only disconnects the branch. In the following example, the disconnected branch has been moved to show that the olet stays with the header.





If the header is at a different workshare location or is in a non-working approval state, the software disconnects the header side objects from the branch, when you disconnect the branch. The software generates To Do Records for the olets, and the software deletes the records only when you update the To Do Record.

Limitations

- You cannot disconnect a branch feature, or an end feature.
- To disconnect a feature on a leg, you must have full control permission to that leg.
- If the selection includes equipment, the software does not disconnect the selection from the equipment nozzle.
- You cannot disconnect a surface-mounted component.

For more information on how the software disconnects objects at boundary connections, see *Disconnecting pipe runs using Move* (on page 240).

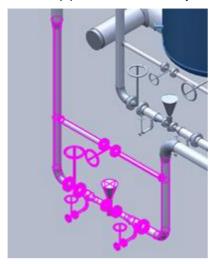
What do you want to do?

- Disconnect a pipeline (on page 209)
- Disconnect a pipe run (on page 211)
- Disconnect a set of features (on page 211)
- Disconnect a feature (on page 212)

Disconnect a pipeline

- 1. Click **Select** on the vertical toolbar.
- 2. Select Pipelines in the Locate Filter.





4. Click Tools > Utilities > Disconnect.

The software disconnects the selection, and prompts you to view the disconnection log.

5. Click Yes to view the log.

A log file displays the disconnection details.

```
Total number of objects in the select set : 1

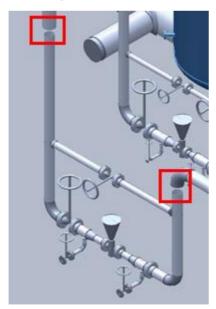
Total number of features selected : 44

List of Boundary features identified :

Pipe End Feature: {000138A4-0000-0000-5F20-C48818432004}

Pipe End Feature: {000138A4-0000-0000-CC18-C48818432004}

Successfully disconnected all boundaries.
```



NOTE The software disconnects the pipeline from the rest of the network, and deletes any mating parts or transitions at the boundary connections. The software also removes the

relationships between the pipeline and the rest of the network.

Press CTRL+Z, or click **Edit** > **Undo Disconnect**. You can also use **Undo Disconnect** on the main ribbon bar.

Disconnect a pipe run

- 1. Click **Select** on the vertical toolbar.
- 2. Select Pipe Runs in the Locate Filter.
- 3. Select a pipe run from the **Graphic View** or the **Workspace Explorer**.
- 4. Click Tools > Utilities > Disconnect.

The software disconnects the selection, and prompts you to view the disconnection log.

5. Click Yes to view the log.

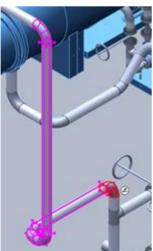
A log file displays the disconnection details.

■ NOTE The software disconnects the pipe run from the rest of the network, and deletes any mating parts or transitions at the boundary connections. The software also removes the relationships between the pipe run and the rest of the network.

Press CTRL+Z, or click **Edit** > **Undo Disconnect**. You can also use **Undo Disconnect** on the main ribbon bar.

Disconnect a set of features

- 1. Click **Select** on the vertical toolbar.
- 2. Select Piping Features in the Locate Filter.
- 3. Select the features from the **Graphic View** or the **Workspace Explorer**.
 - TIP Use SHIFT+SELECT to select multiple features. You can also use the *Route Selection Commands* (on page 100).



4. Click Tools > Utilities > Disconnect.

The software disconnects the selection, and prompts you to view the disconnection log.

5. Click **Yes** to view the log.

A log file displays the disconnection details.

```
Total number of objects in the select set : 6

Total number of features selected : 6

List of Boundary features identified :

Pipe Turn Feature: (000138A6-0000-0000-3140-05D465506F04)

Pipe Turn Feature: (000138A6-0000-0000-5E40-05D465506F04)

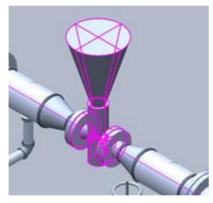
Successfully disconnected all boundaries.
```

NOTE The software disconnects the selection from the rest of the network, and deletes any mating parts or transitions at the boundary connections. The software also removes the relationships between the selection and the rest of the network.

Press CTRL+Z, or click **Edit** > **Undo Disconnect**. You can also use **Undo Disconnect** on the main ribbon bar.

Disconnect a feature

- 1. Click **Select** on the vertical toolbar.
- 2. Select Pipe Features in the Locate Filter.
- 3. Select a feature from the **Graphic View** or the **Workspace Explorer**.



NOTE You cannot select a branch feature or an end feature to disconnect.

4. Click Tools > Utilities > Disconnect.

The software disconnects the selection, and prompts you to view the disconnection log.

5. Click **Yes** to view the log.

A log file displays the disconnection details.

```
Total number of objects in the select set : 1

Total number of features selected : 1

List of Boundary features identified :

Pipe Along Leg Feature: (000138A2-0000-0000-0205-D22F16431F04)

Successfully disconnected all boundaries.
```

NOTE The software disconnects the feature from the rest of the network, and deletes any mating parts or transitions at the boundary connections. The software also removes the relationships between the feature and the rest of the network.

Press CTRL+Z, or click **Edit** > **Undo Disconnect**. You can also use **Undo Disconnect** → on the main ribbon bar.

SECTION 18

Review Component Placement

Tools > Utilities > Review Component Placement allows you to view the step-by-step interaction with reference data rules as you place, modify, or copy a piping component. It ensures that you do not violate any reference data rules during the modeling workflow.

NOTE The **Review Component Placement** tool lists only the selection logic failures. It does not list symbol failures. If you select a component from the Catalog Browser, the software does not use selection logic. For example, the tool does not list on-the-fly component part data because you select the component directly from the Catalog Browser. On-the-fly component placement error is likely due to symbol failures.

See Also

Review Component Placement Dialog Box (on page 214)
Review Component Placement Compatibility With Reference Data (on page 214)

Review Component Placement Compatibility with Reference Data

- 1. Select **Tools > Utilities > Review Component Placement**, or press CTRL+SHIFT+E.

 The **Review Component Placement** dialog box displays.
- 2. Click Record.
- 3. Perform the modeling workflow to check against the reference data rules.
- 4. After you complete the modeling workflow, click **Stop** to stop the recording process.
- Review the rules listed in the Rules pane for errors that may have occurred during the modeling workflow. Rule errors are shown in red.
- Click Export to save the data resulting from the component placement review in XML format.

Review Component Placement Dialog Box

Rules

Displays all available rules. Rules that result in a modeling error are highlighted in red. Rules that are missing information are highlighted in purple.

Details

Displays the details for the selected rule.

Input

Displays the input arguments for the selected rule.

Output

Displays the output arguments for the selected rule.

Description

Displays more information about the selected rule.

Error

Displays any error messages caused by the selected rule.

Cancel

Closes the Review Component Placement dialog box.

Record

Starts the **Review Component Placement** utility. Click **Record** to start comparing the reference data to the modeling process, and click **Stop** to stop the recording process.

SECTION 19

Check Manufacturability

Tools > Check Manufacturability (Tools > Check Hole in the Hole Management task) analyzes objects in the current workspace and reports the objects that will be difficult or impossible to manufacture according to standards defined in the reference data.

Check Manufacturability Ribbon

Provides the following options to check that objects in the model can be manufactured and to generate production information.

Manufacturability Checking Settings

Shows the rules for the checking process. You can select any or all of the rules. For more information, see *Manufacturability Checking Settings Dialog Box* (on page 218).

Check Manufacturability

Starts the checking process. If inconsistencies are found, the message **Manufacturability errors/warnings have been encountered** displays.

Show Manufacturability Inconsistencies

Displays the objects with manufacturing issues. The list includes the issue severity, the assembly name, a description of the assembly, and the name of the rule which detected the manufacturing issue. For more information, see *Show Manufacturability Inconsistencies Dialog Box* (on page 219).

Close

Exits the command.

Submit Job

Displays a message box asking if you want to execute the repair rules subsequently. If you click **Yes**, the **Schedule Planning Check Manufacturability** dialog box displays so that you can schedule the execution of the repair rules at some other time. For more information, see *Schedule [Task] Dialog Box* in the *Batch Services User's Guide* and the *Batch Services Quick Start Guide*.

■ NOTES

- Learn more about SmartPlant Batch Services in the Batch Services User's Guide and the Batch Services Quick Start Guide.
- The Submit Job button is enabled only when Batch Services is installed and started on your computer.
- The data on objects that cannot be manufactured is stored in the session file, not in the model. Problem objects that apply to the Workspace are retrieved when you select the Check Manufacturability command.

What do you want to do?

- Check objects for manufacturability (on page 217)
- Schedule check manufacturability using Batch Services (on page 217)
- View the Manufacturability Checking Settings Dialog Box (on page 218)
- View the Show Manufacturability Inconsistencies Dialog Box (on page 219)

Check objects for manufacturability

- 1. Select objects for checking in the model or in the **Workspace Explorer**.
- 2. Click Tools > Check Manufacturability (Tools > Check Holes in Hole Management).
- 4. Specify the rules for the checking process.
- 5. On the ribbon, click **Check Manufacturability** to start the process.
- 6. On the ribbon, click **Show Manufacturability Inconsistencies .**A list view displays the objects that were found to have manufacturing problems.
- 7. Select one row of the list at a time to view the inconsistency and solution for an object.
- 8. Repair the object manually, or click **Repair** if an **Action Tool** is available.

Schedule check manufacturability using Batch Services

- 1. Select objects for checking in the model or in the **Workspace Explorer**.
- 2. Click Tools > Check Manufacturability.
- 4. Specify the rules for the checking process.
- 5. Click Submit Job.
- 6. Click **Yes** to schedule the job for another time.
- 7. Complete the **Schedule Check Manufacturability** dialog box to configure batch processing, and then click **OK**.

The software displays the message, "This job has been scheduled to run on the chosen server."

8. Click **OK** to dismiss the message.

■ NOTES

• For more information about SmartPlant Batch Services, see the *Batch Services User's Guide* and the *Batch Services Quick Start Guide*.

- After the job is successfully submitted, you can see the PlanningCheckMfcty_BatchJob.xml file in the system temp folder (%temp%). This file contains the required information to run the batch job.
- If any inconsistencies are observed during the execution of the check manufacturability rules that you selected, information about the name of the object, manufacturability rule ProgID, and repair rule ProgID are written to the PlanningCheckMfcty_InConsistencies.log file in the system temp folder (%temp%).

Manufacturability Checking Settings Dialog Box

Sets options for the Check Manufacturability process.

Task List

Displays the list of tasks that contains the **Check Manufacturability** rules defined in the catalog. These tasks allow you to filter the check rules based on the selected task in the **Task List**.

Rule

Select which rules to process check manufacturability against. There are different rules based on the task selected in the **Task List** option. Contact Intergraph Support http://support.intergraph.com for help with customizing the XML data file.

- The Hole Management manufacturability checking process includes checking the distance between hole traces; the distance between the hole trace and plate edges (outside), brackets and coamings; and the distance between the hole trace and seamlines, profiles, and openings. Because hole traces can affect the stress of the deck or bulkhead on which they are placed, it is important to check holes before cutting them. For more information about hole management checks, see Check Hole Rules in the Hole Management Reference Data Guide.
- The Piping manufacturability checking process includes software simulators for cutting, bending, and coating pipe. An XML data file controls the piping simulators. You can customize this file to reflect the requirements, standards, and equipment of your facility. For more information about piping checks, see Piping Check Manufacturability in the Piping Reference Data Guide.
- The Planning manufacturability checking process includes software simulators for planning joints, weld bevels, and slot types on structure. You can customize the planning simulators rules to reflect the requirements, standards, and equipment of your facility. For more information about planning checks, see Check Manufacturability Rules in Planning Reference Data.
- The Structural Detailing checking process includes tee weld chamfer checks based on changes to plate thickness, slot opening angles, and end cut type. For more information, see Check Manufacturability Rules in Structural Detailing Reference Data.
- The Structural Manufacturing checking process includes margin check on the same port, manufacturing plat and profile check, and shrinkage check.

ProgID

Programming ID of the rule that found the inconsistency. Matches the **Rule ProgID** of the rule on the *Show Manufacturability Inconsistencies Dialog Box* (on page 219) .

Select All

Specifies all available rules.

Clear All

Clears all available rules. You can select rules individually in the list view by clicking the boxes beside the rule names.

Stop checking if a manufacturability error is found

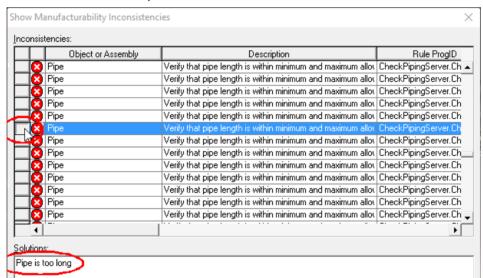
Halts rule processing upon error detection.

Show Manufacturability Inconsistencies Dialog Box

Displays and repairs inconsistencies found by the rules of the Check Manufacturability process.

Inconsistencies

A list view of all inconsistencies. Click the button in the far left column to see the possible solution. Solution descriptions are listed below.



Warning

A minor manufacturability problem has been found. The problem does not have to be repaired.



A major manufacturability error has been found. The error must be repaired.

Object or Assembly

Name of the object with an inconsistency.

Description

Description from the rule of the inconsistency

Rule ProgID

Programming ID of the rule that found the inconsistency. Matches the **ProgID** of the rule on the **Manufacturability Checking Settings Dialog Box** (on page 218)

Action

The type of action that is available in the software to repair the inconsistency. Blank if no software action is available and the repair is done manually.

- COM Repair Object Software code that can be run.
- SQL Script SQL Script that can be run.

Action Tool

ProgID of the COM Repair Object or name of the SQL Script. Blank if Action is blank.

Solutions

Describes the details of an inconsistency and the repair that you need to perform for one selected object from the list.

Repair

Runs the **Action Tool** to perform a repair, if one is available for the rule.

Fit

Fits one or more selected objects from the list view in the active graphic view.

Clear

Clears all inconsistencies and closes the dialog box. You must click **Check**Manufacturability again to display the remaining inconsistencies.

Piping Inconsistencies Solution Messages

Pipe and Spool Length Messages

Pipe is too long

Pipe exceeds standard ordering length for pipe of this size, as defined in the pipe catalog. For bent pipes the length check includes any extra pipe that had to be added at the ends or between bends for clamping (see "Extra pipe must be added at end..." and "Insufficient straight pipe between bends..." messages below.). If the pipe is bent, the elongation of the pipe during bending will be taken into account when reporting this error.

Pipe is too short

Pipe length is less than the company standard for pipes welded on both ends.

Spool is too long

The overall length of the spool exceeds company standards. The length is measured along the main axis of the spool.

Spool is too wide

The "width" in the spool is measured perpendicular to the main axis. This message indicates that the width exceeds company standards. Checks for surface treatment tank size are done separately.

Pipe Bending Messages

Bend angle too large

A pipe bend exceeds the maximum bend angle that the bending machine can make.

Bend angle too small

A pipe bend angle is less than the company standard for bends. That is, the pipe is almost straight.

Bends have different radii, not allowed

Pipe has two or more bends, and they do not all have the same bend radius specified.

Bend radius too large or points too close together

The pipe geometry is physically impossible. This is an extreme case of the "insufficient straight pipe between bends..." problem. This problem may be fixed by moving a bend or using a smaller bend radius.

Extra pipe must be added at end, pipe end too short for bending machine to clamp onto

The bending machine needs a sufficiently long straight section at the start and end of the pipe to clamp onto (start), and support (end). This is a warning; bending can be done with a longer piece of pipe, with the extra pipe cut off afterwards.

Insufficient straight pipe between bends for bending machine to clamp onto

The bending machine needs a sufficiently long, straight section between bends to clamp the pipe. This problem may be fixed by moving a bend, by using a smaller bend radius, or by splitting the pipe and putting a joint between the bends.

No pipe bending machine for pipe diameter and bend radius

None of the pipe bending machines listed in the pipe shop XML data file have bend dies listed for the pipe diameter and bend radius of this pipe.

Pipe hits machine or floor during bending

The pipe cannot be bent because the free end or part of the pipe would hit the bending machine or the shop floor during bending. The simulator will have evaluated bending the pipe starting from either end before reporting this error, and will have checked all available bending machines with bend dies of the right size.

■ NOTE If the pipe has flanges on either end, and the Flange Welding check option has been selected, the simulator also checks for attached flange (if any) hitting the machine during bending.

Pipe and Spool Complexity

Too many bends in pipe

The number of bends in the pipe exceeds the company standard. This limit is normally set to maintain dimensional accuracy standards because of accumulated error during bending.

Too many branches

The number of branches off of a main exceeds the company standard limit.

Too many planes in spool

The spool is difficult to fabricate because it is geometrically complex. That is, the number of independent planes exceeds the company standard for spools.

Treatment Tank

Spool too large for treatment tank

A spool that requires galvanization or other tank treatment is too large for the tank.

No treatment tank found for <treatment_name> required by pipe spool

No treatment tank has been given in PipeBenders.xml for the treatment type called out by the pipe specification. This is an error in the editing of the PipeBenders.xml file, not a design error in the piping.

Individual pipes in spool require different tank treatments

A pipe spool is composed of multiple pipes that reference different pipe specs, and those pipe specs call out different, conflicting tank treatments.

Flange Welding

Flange hits machine or floor during bending, weld after bending

Flanges cannot be welded on the pipe before bending because they would hit the bending machine or the shop floor during bending. The simulator will have evaluated bending the pipe starting from either end before reporting this error, and will have checked all available bending machines with bend dies of the right size.

Pipe too long for automatic flange welding

This is a warning that a straight pipe with flanges on one or both ends is too long to be put through the automatic flange welder, and must be manually welded.

Pipe too short for automatic flange welding

This is a warning that a straight pipe with flanges on one or both ends is too short to be put through the automatic flange welder, and must be manually welded.

Inside Grinding and Painting

Pipe too long for inside coating

A pipe requires internal coating, but the pipe is too long for the available Pipe Internal Sprayer.

No internal sprayer found for inside coating

A pipe requires internal coating (as defined in the pipe spec entry in the XML file), but there is no Pipe Internal Sprayer available for the required coating material or for the pipe diameter.

Inaccessible for internal coating

A pipe that requires internal coating after bending has two or more bends. The sections between the bends are inaccessible for coating.

Bend on branch not allowed

A branch weld is inaccessible for grinding after welding because of a bend in the branch pipe.

Branch too far from end of main

Grinding cannot be done on a branch connection because it is too far from the end of the pipe.

Planning Inconsistencies Solution Messages

First Meet Check

First Meet assembly does not match the Planning Joint assembly

The planning joint is not located under the assembly containing the parts joined by the planning joint.

Hierarchy Check

Planning joint is not in an assembly that contains the two joined parts

The planning joint is located neither under the assembly containing the parts joined by the planning joint nor under a parent assembly/block of the assembly.

Physical Connection Check

Weld name is unknown

The weld bevel of a physical connection is not known because of a change to its associated planning joint.

Production Equipment Check

Production Equipment is not assigned to the assembly

The assembly has no production equipment assigned or the assigned production equipment is not compatible and cannot perform the weld.

Weld Side Check

The Weld Side of the Planning Joint is incorrect

The weld side of the planning joint is incorrect.

SECTION 20

Routing with Point Cloud Data

Using CloudWorx for Intergraph Smart™ 3D plug-in, you can import the point cloud data of any 3D laser scanned model into Smart 3D. After importing and loading the point cloud data, you can efficiently re-design the distributed pipeline system using the Piping commands and by selecting appropriate point cloud points. Each point within the point cloud has an accurate 3D position. You can select a point on the point cloud, and start routing pipe runs as needed. You can also insert piping components and position them accurately on the point cloud.

★ IMPORTANT CloudWorx for Smart 3D 2014 R1 installed on Smart 3D 2014 R1 only supports routing and inserting components using point cloud data.

Pre-requisites

Before you start routing using the point cloud data, you must ensure that the following pre-requisites are met:

- Install CloudWorx for Smart 3D 2014 R1. For more information about installing CloudWorx for Smart 3D 2014 R1, refer to the CloudWorx for Smart 3D Installation topic in the CloudWorx for Smart 3D 2014 (10.1) Installation Guide.
- 2. Add and configure the databases. For adding a database, refer to the *Getting Started* > *Adding a Database* topic in the *CloudWorx for Smart 3D User's Guide*. For configuring the databases, refer to the *CloudWorx Menu* > *Configure Databases* topic in the *CloudWorx for Smart 3D User's Guide*.
- 3. Reference a point cloud. For more information about referencing a point cloud, refer to the Using Reference Models > Point Cloud Model Reference topic in the Project Management User's Guide.
- 4. Load a point cloud and reference multiple ModelSpace views. For more information about loading and referencing multiple modelspace views, refer to the *Loading a Point Cloud* and *Reference Multiple ModelSpace Views* topics in the *Getting Started* section of the *CloudWorx for Smart 3D User's Guide*.
- 5. Add a filter using **Define Workspace**. To add a filter,
 - a. Open Smart 3D and click File > Define Workspace.
 - b. Select the required plant and filter from the respective boxes in the **Define Workspace** dialog box and click **OK**.
 - Select the Point Cloud Graphics and PointCloud Leica Geosystems Inc. options in the site database tree.
 - d. Click **OK** to save changes to session file.
 - e. When you open a session file that has defined filter, the software displays the **Import ModelSpace View** dialog box. Click **Browse** and select the **ModelSpace View** to open. Click **OK**. The software loads point clouds into Smart 3D. For more information, refer to the CloudWorx Menu > Import ModelSpace View topic in the CloudWorx for Smart 3D User's Guide.

6. Use **Import ModelSpace View** to import a Cyclone ModelSpace View and save the project, or use **Open Project** to open a saved CloudWorx project. For more information, refer to the *CloudWorx Menu > Import ModelSpace View* topic in the *CloudWorx for Smart 3D User's Guide*.

Points to Consider

- You must first place a straight feature to insert a component in the point cloud environment.
- Make sure that you select the point cloud points in sequence while routing the pipe in the
 point cloud environment. If you do not select the point cloud points in sequence, the software
 might not give proper results.
- In normal routing scenario, if you select PointCloud Leica Geosystems as the point cloud vendor in Project Management and if the CloudWorx for Smart 3D is installed on your computer, then the Back End of the Flange options are available irrespective of whether you define the point cloud reference in workspace or not.

Limitations

- You cannot arc route using point cloud data. If you click Arc Routing and select any
 point cloud point, the software ignores the selected cloud point, and you will be routing in
 free space mode.
- You cannot use cardinal point offset references from point cloud data. You must select the pipe centerline as the offset reference.

See Also

Route pipe using point cloud data (on page 225)
Insert component using point cloud data (on page 230)

Route pipe using point cloud data

Use the **Route Pipe** from a point cloud point.

What do you want to do?

- Route a pipe (on page 225)
- Route a branch (on page 227)
- Route a pipe from an existing nozzle (on page 228)
- Route a pipe to place a reducer (on page 229)
- Route a pipe from end feature or component free port (on page 230)

Route a pipe

- 1. Click Route Pipe \overline{Y} on the vertical toolbar.
- 2. Press CTRL+SHIFT, and then select a point cloud point along the pipe on which you want to route the pipe run.

The **New Pipe Run** properties dialog box displays.

The software displays the compute graphics of the pipe run.

■ NOTE Make sure that you unlock the **Angle** command and set the plane to **No Plane** to route using point cloud data. You should not specify **Slope** while routing the pipe runs as the routing is based on start and end points.

3. If the diameter of the existing pipe run is not equal to the point cloud diameter, follow the below procedure:

The software displays the following message: "The current pipe run nominal diameter is not equal to the point cloud pipe run diameter. Do you want to create a new pipe run using the point cloud diameter?"

 Click **No** to override the current pipe run diameter with the point cloud diameter. Skip to step 5.

OR

b. Click **Yes** to create a new pipe run with user defined diameter. Skip to step 4.

The **New Pipe Run** properties dialog box is displayed.

- 4. Modify the diameter of the pipe as necessary.
- 5. Click OK.

■ NOTE If you specify the insulation thickness, then the thickness is deducted from the outer diameter of the pipe run. For more information, refer to *Insulation thickness of a pipe* (on page 230).

6. Select a new point on another leg and continue routing the pipe run.

■ NOTES

- You can select the point cloud point on the same leg or the second leg. If you select the point on the same leg, the software inserts a straight feature from the initial pipe graphics to the second selected point. If you select the point on the second leg, the pipe is placed up to the intersection point of two legs and constrained along the second leg feature. The software inserts a turn feature and an additional straight feature from the turn feature to the third point specified and the route is confined to the centerline of the second leg which is identified.
 - If you select the third point on the same leg, the software inserts the straight feature from the turn feature to the selected third point.
 - If you select the third point on the next leg, the software inserts the straight feature from the turn feature to the intersection point and continues routing.
 - If you select the third point on free space, the software inserts the straight feature from the turn feature to the projected point (of the free space point) on the center of the selected point cloud and continues in free space routing.
- You cannot arc route using point cloud data. When you click Arc Route , and select any point cloud point, the software displays the following message:
 - "You cannot arc route from point cloud data. The selected cloud point will be ignored, and you will be routing in free space mode".
- You cannot use cardinal point offset references from point cloud data. When you select any cardinal point and click **Route Pipe** , the software displays the following message:

"You cannot use cardinal point offset references from point cloud data. Please select the pipe centerline as the offset reference".

Route a branch

You can branch in or branch out from an existing header pipe run.

Branch into a header pipe run

- 1. Click **Route Pipe** on the vertical toolbar.
- 2. Press CTRL+SHIFT to select a point cloud point.
 - NOTE Make sure that you unlock the Angle to route from point cloud data.
- 3. Select an existing header pipe to branch into the header pipe run.

The pipe run branches into the header pipe run.

NOTES

- Branching components are placed automatically if they are in alignment with the header pipe run.
- If the pipe is not coincident with the header pipe, the software logs the following error message in Smart 3D log.

Branch out from a header pipe run

- 1. Locate the header pipe run.
- 2. Click **Route Pipe** \overline{Y} on the vertical toolbar.
- 3. Select a point on the header pipe to branch out.

The **New Pipe Run** properties dialog box is displayed.

- 4. Provide the new pipe run properties in the New Pipe Run properties dialog box.
- 5. Click OK.
 - NOTE Make sure that you unlock the Angle to route from point cloud data.
- 6. Press CTRL + SHIFT to select a point on the branch pipe run.

The software displays the corresponding dialog boxes if the point cloud pipe run diameter and the current pipe run diameter does not match.

NOTE If the pipe is not coincident with the header pipe, the software logs the following error message in **Smart 3D** log.

"System was unable to compute an intersection point from the point cloud data. Routing will be continued in free space without Point Cloud assistance".

7. If the diameter of the new pipe run is not equal to the point cloud diameter, follow the below procedure:

The software displays the following message: "The current pipe run nominal diameter is not equal to the point cloud pipe run diameter. Do you want to override the current pipe run

[&]quot;System was unable to compute an intersection point from the point cloud data. Routing will be continued in free space without Point Cloud assistance".

nominal diameter using the point cloud diameter?"

a. Click **Yes** to override the current pipe run diameter with point cloud diameter. Skip to step 9.

OR

b. Click No to use the existing diameter of the pipe run. Skip to step 10.

The New Pipe Run properties dialog box is displayed.

8. If the diameter of the existing pipe run is not equal to the point cloud diameter, follow the below procedure:

The software displays the following message: "The current pipe run nominal diameter is not equal to the point cloud pipe run diameter. Do you want to create a new pipe run using the point cloud diameter?"

a. Click **No** to continue routing with initially selected pipe run diameter. Skip to step 10.

OR

b. Click **Yes** to create a new pipe run with user defined diameter. Skip to step 9.

The New Pipe Run properties dialog box is displayed with point cloud diameter.

- 9. Modify the diameter of the pipe as necessary.
- 10. Click OK.

The pipe is constrained along the point cloud branch feature.

11. Select another point cloud point on the same pipe to place a branch feature to that point or next leg to continue routing.

The branch feature is placed if it is defined in the catalog for the selected angle.

12. Continue routing.

Route a pipe from an existing nozzle

- 1. Locate an existing nozzle.
- 2. Click **Route Pipe F**on the vertical toolbar, and then select an existing nozzle.

The New Pipe Run properties dialog box is displayed.

- NOTE Make sure that you unlock the **Angle** to route from point cloud data.
- 3. Provide the new pipe run properties in the New Pipe Run dialog box and click OK.
- 4. Press CTRL+SHIFT, and then select a point cloud point on the pipe run near the nozzle.
 - NOTE If the pipe is not coincident with existing nozzle, the software logs the following error message in **Smart 3D** log.
 - "System was unable to compute an intersection point from the point cloud data. Routing will be continued in free space without Point Cloud assistance".
- 5. If the diameter of the new pipe run is not equal to the point cloud diameter, follow the below procedure:

The software displays the following message: "The current pipe run nominal diameter is not equal to the point cloud pipe run diameter. Do you want to override the current pipe run

nominal diameter using the point cloud diameter?"

a. Click **Yes** to override the current pipe run diameter with point cloud diameter. Skip to step 7.

OR

b. Click No to use the existing diameter of the pipe run. Skip to step 8.

The New Pipe Run properties dialog box is displayed.

6. If the diameter of the existing pipe run is not equal to the point cloud diameter, follow the below procedure:

The software displays the following message: "The current pipe run nominal diameter is not equal to the point cloud pipe run diameter. Do you want to create a new pipe run using the point cloud diameter?"

a. Click No to continue routing with initially selected pipe run diameter. Skip to step 8.

OR

b. Click **Yes** to create a new pipe run with user defined diameter. Skip to step 7.

The New Pipe Run properties dialog box is displayed with point cloud diameter.

- 7. Modify the diameter of the pipe as necessary.
- 8. Click OK.
- 9. Press CTRL+SHIFT, and then select another point cloud point on the pipe to place the pipe. You can select a point cloud point on the second leg to place the pipe.
- 10. Continue routing.

Route a pipe to place a reducer

- 1. Locate the reducer.
- 2. Click **Route Pipe** on the vertical toolbar, and then press CTRL+SHIFT to select a point cloud point.

The software displays the compute graphic of the pipe.

3. Press CTRL+SHIFT to select another point cloud point near to reducer where the pipe run size changes.

The **New Pipe Run** properties dialog box is displayed with new diameter of the pipe run.

- 4. Modify the diameter of the pipe as necessary.
- 5. Click OK.

The reducer component is placed.

6. Continue routing.

■ NOTE You might need to manually move the reducer to adjust its position depending on your selection of the point. The software places the reducer at the exact position if you select a point near to the reducer.

Route a pipe from end feature or component free port

- 1. Click **Route Pipe %** on the vertical toolbar.
- 2. Select an existing end feature and press CTRL+SHIFT to select a point cloud point.
- 3. Select a point along the current straight feature to end the pipe run.

OR

Select a point on the second leg feature.

The software calculates the intersection point of the two pipes and places a pipe till the intersection point.

NOTE You need to manually move and adjust the end feature of the current pipe run if the intersection point of the two pipe runs is beyond the end feature.

Insulation thickness of a pipe

While routing a pipe using point cloud data, if you do not change the nominal diameter of the pipe run generated by the software and specify the insulation thickness of the pipe under **Insulation and Tracing** category, the software displays the following message:

"As the Insulation Thickness has been changed, do you want to change the Nominal Diameter to "n" inch?"

- Click Yes to change the nominal diameter to n-inch.
- Click No to retain the existing diameter.

Here "n-inch" refers to the nominal diameter generated by the software after deducting the insulation thickness from the outer diameter of the pipe.

■ NOTES

- If you override the outer diameter of the pipe and then change the insulation thickness to some value, then the software accepts the nominal diameter change and the insulation thickness is not deducted from the changed outer diameter.
- If you change the nominal diameter of the pipe run for the first time, the software automatically suggests the appropriate insulation thickness for the pipe run. You can also change the thickness of the pipe, if required. The insulation thickness is suggested only if you try to define the thickness in the Insulation and Tracing category for the first time.

Insert component using point cloud data

You can insert and modify all piping components that are defined in the piping specification. The software places the component that you select. After placement, you can precisely position and orient the component relative to point cloud component by modifying appropriate properties. This allows you to efficiently model as-built pipe runs in the existing model for restoration, maintenance, and asset management.

Positioning a flanged component

You can position the flanged component accurately relative to point cloud component using the **Reference position** option on the **Insert Component** ribbon. The software uses the back end

of the flange as the reference, and places the component. If the base component has two mating parts as flanges, then the **Back End of Flange One** and **Back End of Flange Two** back ends are oriented in the order of leg direction. **Back End of the Flange** is displayed only when the base component has one mating flange.

Back End of Flange One - Defines the first mating flange as the reference position.

Back End of Flange Two - Defines the second mating flange as the reference position.

■ NOTES

- Back End of Flange One and Back End of Flange Two or Back End of the Flange
 options are available only when you place a component on pipe straight feature, pipe end
 feature, component free port, and component connected port.
- CloudWorx helps you in positioning the component to fit exactly on the point cloud data. The positioning of component on the point cloud data is dependent on many parameters such as density of points, point cloud point selected, and diameter of the pipe run. If the component is not placed properly, you can use the manual options available in the Reference position option on the Insert Component ribbon to position the component.



- 1 Back End of the Flange One
- 2 Back End of the Flange Two
- 3 Leg Direction

What do you want to do?

- Insert component on a pipe straight feature (on page 232)
- Insert component on a pipe end feature (on page 232)
- Insert component on a free component port (on page 232)
- Insert component on a connected component port (on page 232)
- Rotate a component (on page 233)

Insert component on a pipe straight feature

- 1. Click **Insert Component** on the vertical toolbar.
- 2. Select the pipe straight feature on which to insert the component.
- 3. In the **Type** box, select a component type.
- 4. Click **Slide** \$\frac{1}{3}\$, and press CTRL+SHIFT to select a point on the raised back end of point cloud mating flange.

The component is placed on the point cloud data.

5. Click Finish.

The software inserts the component on the pipe straight feature.

Insert component on a pipe end feature

- 1. Click Insert Component at on the vertical toolbar.
- 2. Select the pipe end feature on which to insert the component.
- 3. In the **Type** box, select a component type.
- 4. In the Reference position box, select Back End of the Flange option.
- 5. Click Finish.

The software places the component at the end feature.

Insert component on a free component port

- 1. Click **Insert Component** on the vertical toolbar.
- 2. Select the free component port on which to insert the component.
- 3. In the **Type** box, select a component type.
- 4. In the Reference position box, select Back End of the Flange option.
- 5. Click Finish.

The software places the component at the end feature.

Insert component on a connected component port

- 1. Click **Insert Component** on the vertical toolbar.
- 2. Select the component connected port on which to insert the component.
- 3. In the **Type** box, select a component type.
- 4. In the Reference position box, select Back End of the Flange option.
- 5. Click Finish.

The software places the component at the back end of the flange.

Rotate a component

- 1. On the insert component ribbon, click Rotate $\overline{\mathbb{A}}$.
- 2. Press CTRL+SHIFT, and then select a point on the point cloud component to set the orientation relative to the point cloud component.
- 3. Click Finish.

APPENDIX A

Appendix: Moving at Boundary Connections

If you move a section of a piping network, the software modifies and disconnects the piping network as necessary to maintain the piping design intent. The software lengthens or shortens the pipe as needed to make a connection.

See Also

Connecting pipe runs using Move (on page 234)
Disconnecting pipe runs using Move (on page 240)

Connecting pipe runs using Move

★IMPORTANT To connect pipe objects using Move �:

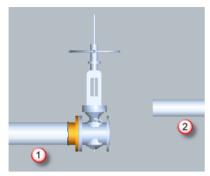
- For inline connections, the pipe ends must be collinear to each other.
- For branch connections, the header and branch runs must be orthogonal to each other.
- There should be sufficient space at the connection to accommodate the connecting part. If the space is not sufficient the software does not make a connection and displays a message suggesting to connect the pipe runs manually.
- The software consumes the first available straight feature of the moved pipe run to accommodate the connection thickness, such as a weld, gasket or mating parts.
- If there are many fitting-to-fitting connections at the boundary with no straight feature, the software moves the entire move set by the connection thickness distance to accommodate the connection.
- In a partial move, if the connection results in an overlap the software connects the two ends with a To Do Record to maintain the connectivity.
- If there is no space to accommodate the mating parts, the software does not connect the two ends and displays a message suggesting that you manually connect the pipe runs.

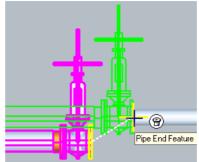
Inline Connections

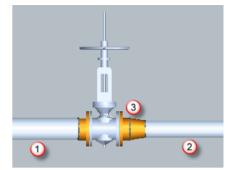
No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Full control/ Write
3	Mating parts connecting the pipe runs A and B		

Result: The software connects pipe runs A and B using the mating parts. The software consumes the pipe run A straight feature to accommodate the connection.

Reduction in straight feature A length = connection thickness



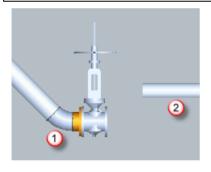


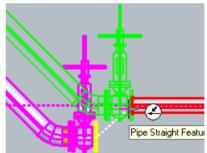


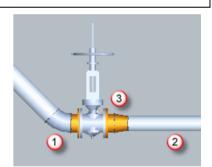
No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Full control/ Write
3	Mating parts connecting the pipe runs A and B		

Result: The software connects pipe runs A and B using the mating parts. The software consumes the pipe run B straight feature to accommodate the connection. This is an exception as the pipe run A has no straight feature to consume.

Reduction in straight feature B length = connection thickness



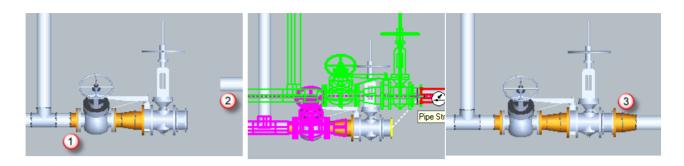




No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Full control/ Write
3	Mating parts connecting the pipe runs A and B		

Result: The software connects pipe runs A and B using the mating parts. The software consumes the pipe run A straight feature to accommodate the connection.

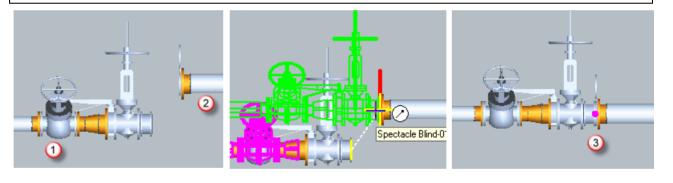
Reduction in straight feature A length = connection thickness



No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Full control/ Write
3	Gasket connection		

Result: The software connects pipe runs A and B. The software moves the fittings on pipe run A back to accommodate the gasket connection.

Reduction in straight feature A length = gasket thickness

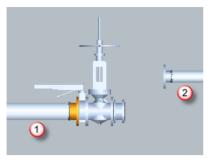


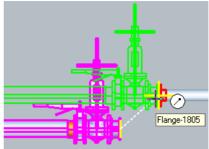
Flanged Connections

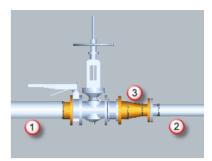
No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Full control/ Write
3	Mating parts connecting the pipe runs A and B		

Result: The software connects pipe runs A and B using a mating reducer. The software moves back all the fittings on the pipe run A by a distance necessary to accommodate the mating reducer and mating flanges.

Reduction in straight feature A length = connection thickness

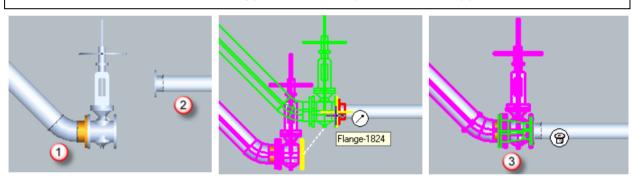






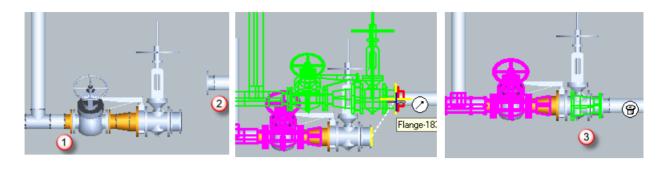
No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Full control/ Write
3	Connection overlap		

Result: The software does not connect pipe runs A and B. The connection parts and the component overlap as there is no space to accommodate the connection. You can manually place the connection parts and connect the pipe runs.



No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Full control/ Write
3	Connection overlap		

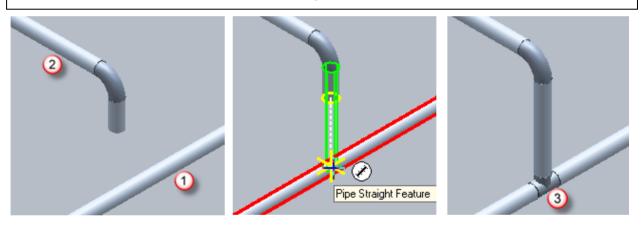
Result: The software does not connect pipe runs A and B. The connection parts and the component overlap as there is no space to accommodate the connection. The software displays a message suggesting you to connect the pipe runs manually.



Branch Connections

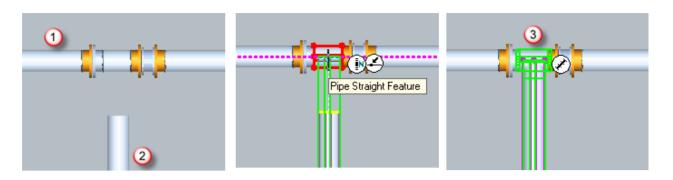
No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Working	Full control/ Write
3	Tee associated with branch run		

Result: The software connects the header and branch runs using a tee.



No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Working	Full control/ Write
3	Connection overlap		

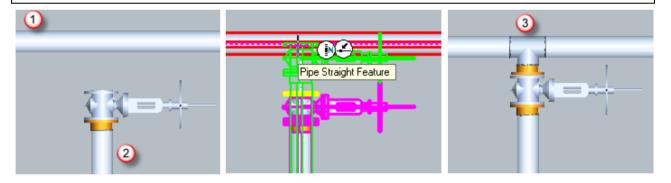
Result: The software does not connect the header and branch runs, as there was not enough space to accommodate a tee. The software displays a message suggesting you to connect the branch and header manually.



No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Working	Full control/ Write
3	Connection		

Result: The software connects the header and branch runs. The branch fittings are moved to accommodate the connecting parts.

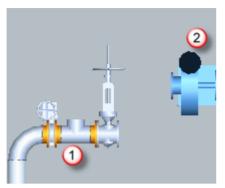
Reduction in branch straight length = connection thickness

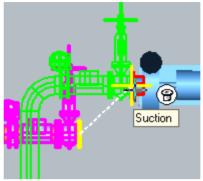


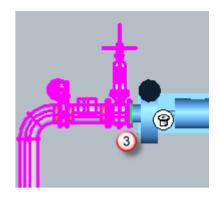
Equipment Connection

No.	Route Object	Approval Status	Permission Group Access
1	Pipe run	Working	Full control/ Write
2	Equipment	Working	-
3	Connection overlap		

Result: The software does not connect the pipe run to equipment. The suction nozzle and the gasket overlap as there is no space to accommodate the connection. The software displays a message suggesting you to connect the branch and header manually.







Disconnecting pipe runs using Move

When you move a pipe run away or disconnect, the software deletes all the associated boundary connections. Base parts at the boundary connections are retained. The software deletes the mating parts if they are in working state. If the mating part is in non-working state or in different satellite location, the software generates a To Do Record for that part. To complete the disconnection you must update the To Do Record, and to update you must have Write access on the object.

If moving a selection is restricted by adjacent features, use **Disconnect** to disconnect that selection, and then use **Move** to move the selection without disturbing the rest of the network. For more information, see *Disconnect* (on page 208).

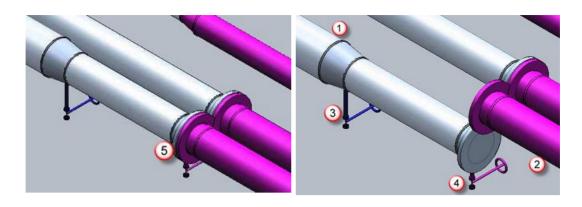
See Also

Pipe run to pipe run connections (on page 240) Header to branch connections (on page 242) Equipment to pipe run connections (on page 245)

Pipe run to pipe run connections

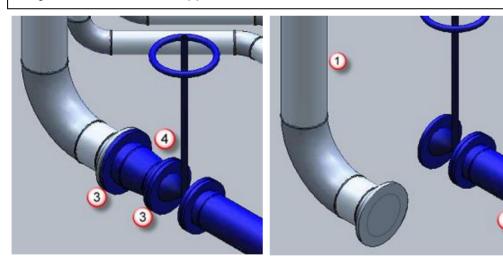
No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Non-working	Full control/ Write
3	Free leg 1	Working	Read-only
4	Free leg 2	Non-working	Full control/ Write
5	Pipe runs connected via base flanges		

Result: The software disconnects pipe runs, and deletes all associated connections. Base flanges are not deleted. The free legs stay with the pipe run A irrespective of the their approval status and permission group access.



No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Read-only
3	Mating flange associated with pipe run B		
4	Mating reducer associated with pipe run B		

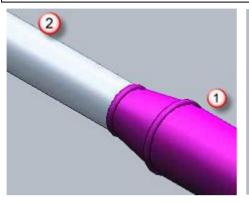
Result: The software disconnects pipe runs and deletes all associated connections. Mating flanges and the mating reducer are deleted. Both the pipe runs become discontinuous.

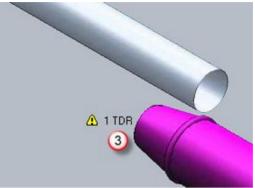


No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Non-working	Full control/ Write
2	Pipe run B	Working	Full control/ Write

3 Mating reducer associated with pipe run A

Result: The software disconnects pipe runs, and deletes all associated connections. The mating reducer is not deleted, as it is in non-working status. Both the pipe runs become discontinuous. You must update the To Do Record on the reducer to delete the mating part. To update the To Do Record you must have Wrtie access on the part.

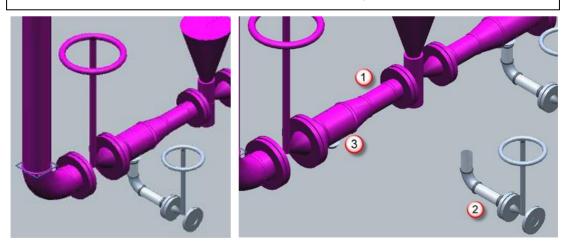




Header to branch connections

Moving Branch Run at Olet, Stub-In or Tap Connections

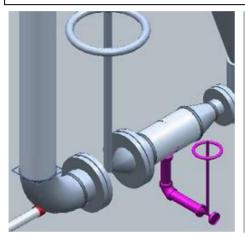
No.	Route Object	Approval Status	Permission Group Access	
1	Header run	Non-working	Full control/ Write	
2	Branch run	Working	Full control/ Write	
3	Header and branch connected via olet			
Result: The software disconnects the header and branch runs; the olet stays with the header run.				

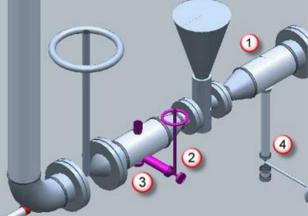


Moving Header Run at Olet, Stub-In or Tap Connections

No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Non-working	Full control/ Write
3	Header and branch connection via olet		
4	Free leg associated with the header run		

Result: The software disconnects the header and branch runs, and deletes all associated connections. The olet is not deleted and stays with the header run. The free leg follows the header run. The branch run becomes discontinuous.

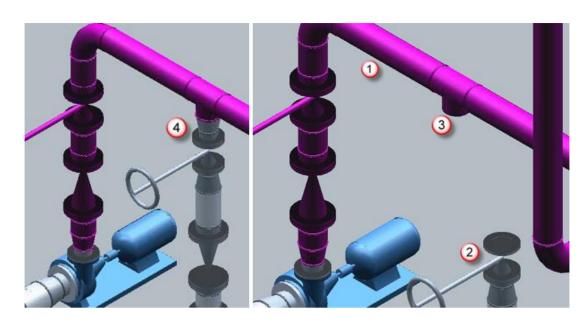




Moving Branch Run at Tee Connection

No.	Route Object	Approval Status	Permission Group Access
1	Header run	Non-working	Full control/ Write
2	Branch run	Working	Full control/ Write
3	Header and branch connection via mating reducing		
4	Tee associated with the header run		

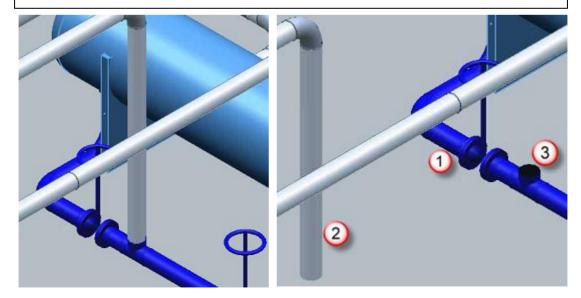
Result: The software disconnects the header and branch runs, deletes the mating reducer, mating flange, and all associated connections. The tee is not deleted and stays with the header run. The branch run becomes discontinuous.



No.	Route Object	Approval Status	Permission Group Access
1	Header run	Non-working	Read-only
2	Branch run	Working	Full control/ Write
3	Header and branch connection via tee		

Result: The software disconnects the header and branch runs, and deletes all associated connections. The tee is not deleted and stays with the header run. The branch run becomes discontinuous.

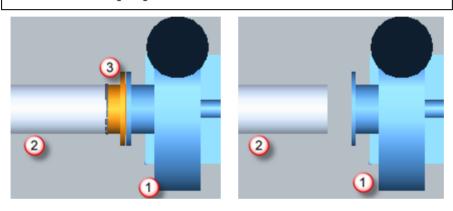
A tee is always considered as a base part.



Equipment to pipe run connections

No.	Route Object	Approval Status	Permission Group Access
1	Equipment	-	Read-only
2	Pipe run	Working	Full control/ Write
3	Mating flange associated with the pipe run		

Result: The software disconnects the equipment and pipe run, and deletes all associated connections. The mating flange is also deleted.



APPENDIX B

Appendix: Deleting at Boundary Connections

If you delete a pipe run connected to another pipe run, or an equipment the software deletes all associated boundary connections. Also, if you delete a header run, or branch run, the software deletes all associated connections between the header and branch run.

The software deletes the mating parts if they are in working state. If the mating part is in non-working state or in different satellite location, the software generates a To Do Record for that part. To complete the deletion you must update the To Do Record, and to update you must have Write access on the object.

You cannot delete a route object in non-working status, such as **Approved**, **In Review**, and **Rejected**. But, deleting route objects in a permission group with read-only access has few exceptions. Also, in a Global Workshare Configuration deleting route objects at a different satellite location has exceptions. These exceptions are illustrated in the following topics.

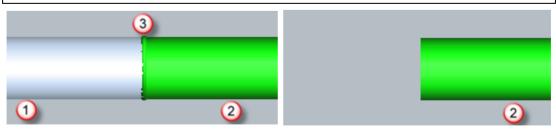
See Also

Pipe run to pipe run connections (on page 246) Header to branch connections (on page 252) Equipment to pipe run connections (on page 262)

Pipe run to pipe run connections

Welded Connection

No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Non-working	-
3	Welded connection		
Rasi	Result: If you delete nine run A, the software deletes nine run A, including the weld and associated connections		



Before deletion After deletion

Flanged Connections

Route Object	Approval Status	Permission Group Access
Pipe run A	Working	Full control/ Write
Pipe run B	Non-working	-
Base/Mating flange associated with pipe run A		
Base flange associated with pipe run B		
	Pipe run A Pipe run B Base/Mating flange associated with p	Pipe run A Working Pipe run B Non-working Base/Mating flange associated with pipe run A

Result: If you delete pipe run A, the software deletes pipe run A, including all associated objects and connections.

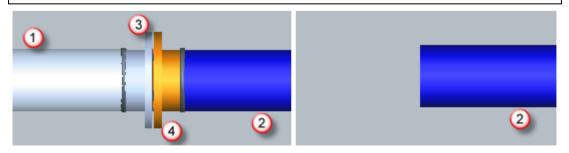


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Read-only
3	Base flange associated with pipe run A		
4	Mating flange associated with pipe run B		

Result: If you delete pipe run A, the software deletes pipe run A, including the mating flange, all associated objects and connections.



Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Read-only
3	Base flange associated with pipe run A		
4	Mating flange associated with pipe run B		

Result: If you delete pipe run A, the software deletes pipe run A including all associated objects and connections. The mating flange remains, and the software generates a To Do Record for the mating flange. You must have Write access on the mating flange to update the To Do Record.



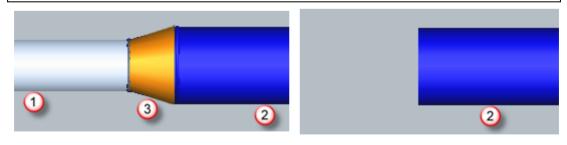
Before deletion

After deletion

Size Change Connections

No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Read-only
3	Mating reducer associated with pipe run B		

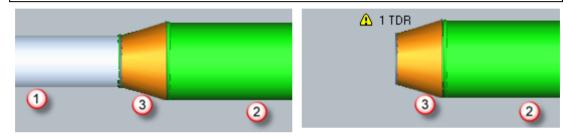
Result: If you delete pipe run A, the software deletes pipe run A, including the mating reducer and associated connections.



Before deletion After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Non-working	Full control/ Write
3	Mating reducer associated with pipe run B		

Result: If you delete pipe run A, the software deletes pipe run A, including all associated connections. The reducer remains, and the software generates a To Do Record for the reducer. You must have Write access on the reducer to update the To Do Record.



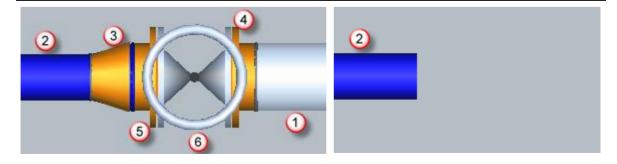
Before deletion

After deletion

Flanged and Size Change Connections

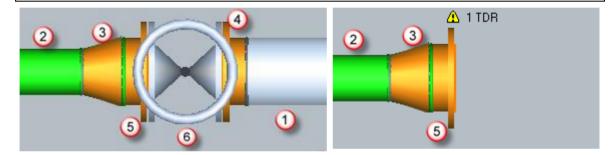
No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Read-only
3	Mating reducer associated with pipe run B		
4	Mating flange associated with pipe run A		
5	Mating flange associated with pipe run B		
6	Component associated with pipe run A		

Result: If you delete pipe run A, the software deletes pipe run A, including the mating parts, all associated objects and connections.



No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Non-working	-
3	Mating reducer associated with pipe run B		
4	Mating flange associated with pipe run A		
5	Mating flange associated with pipe run A		
6	Component associated with pipe run A		

Result: If you delete pipe run A, the software deletes pipe run A, including all associated objects and connections. The software does not delete the mating flange and generates a To Do Record for the mating flange. You must have Write access to the mating flange to update the To Do Record.

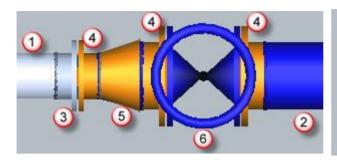


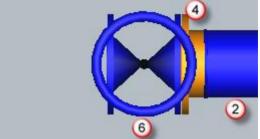
Before deletion After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Working	Read-only
3	Base flange associated with pipe run A		
4	Mating flanges associated with pipe run B		
5	Mating reducer associated with pipe run B		
6	Component associated with pipe run B		
Result: If you delete pipe run A, the software deletes pipe run A, including mating parts, all associated objects and			

Piping User's Guide 250

connections.



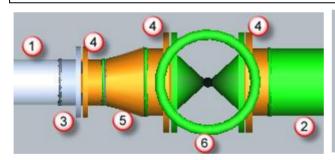


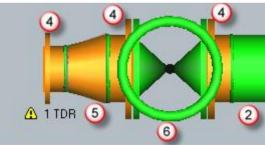
Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Pipe run A	Working	Full control/ Write
2	Pipe run B	Non-working	Full control/ Write
3	Base flange associated with pipe run A		
4	Mating flanges associated with pipe run B		
5	Mating reducer associated with pipe run B		
6	Component associated with pipe run B		

Result: If you delete pipe run A, the software deletes pipe run A, including all associated objects and connections. The software generates a To Do Record for the mating flange. You must have Write access to the mating flange to update the To Do Record.





Before deletion

After deletion

See Also

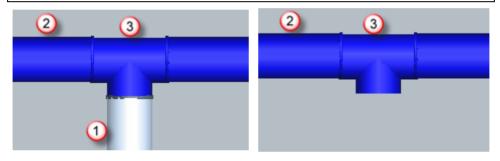
Header to branch connections (on page 252) Equipment to pipe run connections (on page 262)

Header to branch connections

Deleting branch run at tee connection

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Working	Read-only
3	Tee associated with header run		

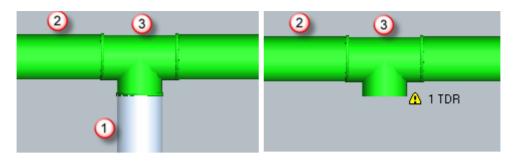
Result: If you delete the branch, the software deletes the branch and associated connections. The tee is not deleted.



Before deletion After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Non-working	Full control/ Write
3	Tee associated with header run		

Result: If you delete the branch, the software deletes the branch and associated connections. The tee is not deleted, and the software generates a To Do Record for the tee. You must have Write access to the tee to update the To Do Record.

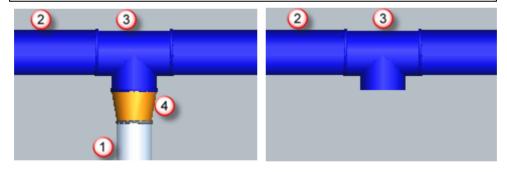


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Working	Read-only
3	Tee associated with header run		
4	Mating reducer associated with the branch run		

Result: If you delete the branch, the software deletes the branch, including all associated objects, and connections.

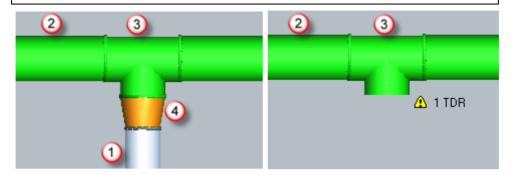


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Non-working	Full control/ Write
3	Tee associated with header run		
4	Mating reducer associated with the branch run		

Result: If you delete the branch, the software deletes the branch run, including all associated objects and connections. The software does not delete the tee, and a To Do Record is generated for the tee. You must have Write access to the tee to update the To Do Record.

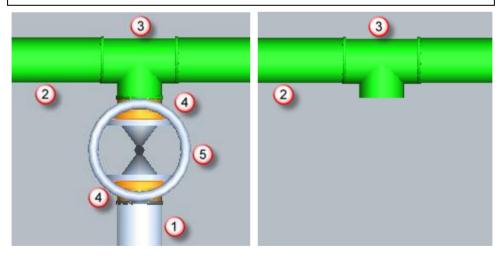


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Non-working	-
3	Tee associated with header run		
4	Mating flanges associated with the branch run		
5	Component associated with the branch run		

Result: If you delete the branch, the software deletes the branch run, including all associated objects and connections. The tee remains.



Before deletion

After deletion

See Also

Deleting header run at tee connection (on page 257)

Deleting header run at Olet, Stub-in or Tap connections (on page 260)

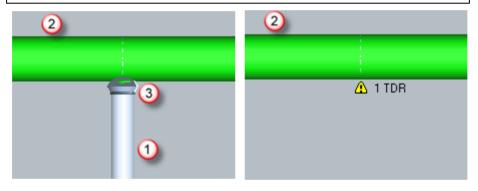
Deleting a branch run at Olet, Stub-in, or Tap connections (on page 255)

Deleting a branch run at Olet, Stub-in, or Tap connections

■ NOTE The following behavior applies to all types of olets, reinforcing pad and reinforcing weld parts, stub-in and tap connections.

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Non-working	Full control/ Write
3	Olet associated with the branch run		

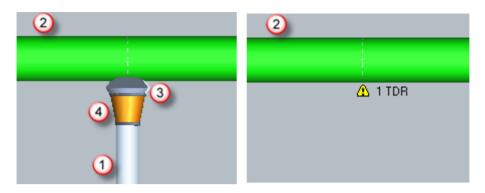
Result: If you delete the branch, the software also deletes the branch run, including all associated objects and connections. The software generates a To Do Record for the split at the branch point. You must have Write access to the split to update the To Do Record.



Before deletion After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Non-working	Full control/ Write
3	Olet associated with the branch run		
4	Mating reducer associated with the branch run		

Result: If you delete the branch, the software deletes the branch run, including all associated objects and connections. The software generates a To Do Record for the split for the split at the branch point. You must have Write access to the split to update the To Do Record.

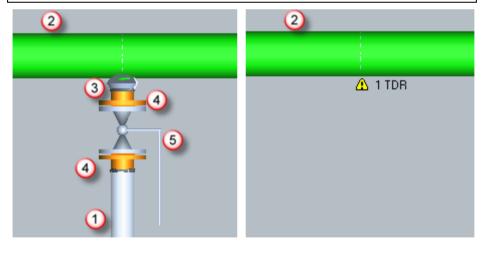


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Non-working	Full control/ Write
3	Olet associated with the branch run		
4	Mating flanges associated with the branch run		
5	Component associated with branch run		

Result: If you delete the branch, the software deletes the branch run, including all associated objects and connections. The software generates a To Do Record for the split for the split at the branch point. You must have Write access to the split to update the To Do Record.



Before deletion

After deletion

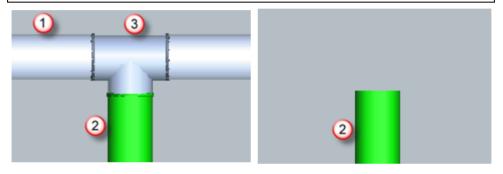
See Also

Deleting header run at Olet, Stub-in or Tap connections (on page 260) Deleting branch run at tee connection (on page 252) Deleting header run at tee connection (on page 257)

Deleting header run at tee connection

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Non-working	-
3	Tee associated with header run		

Result: If you delete the header, the software deletes the header, including all associated connections.

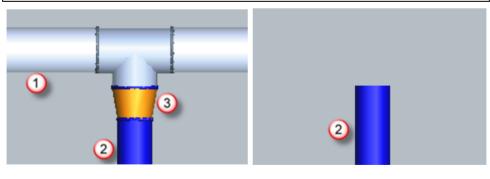


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Branch run	Working	Full control/ Write
2	Header run	Working	Read-only
3	Mating reducer associated with branch run		

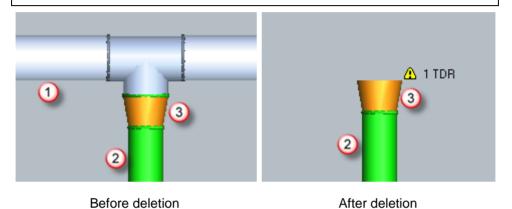
Result: If you delete the header, the software deletes the header, including mating reducer, all associated objects and connections.



Before deletion After deletion

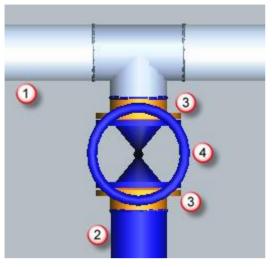
No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Non-working	Full control/ Write
3	Mating reducer associated with the branch run		

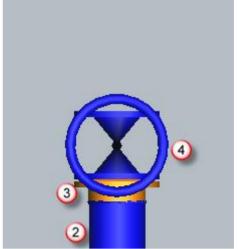
Result: If you delete the header, the software deletes the header, including all associated objects and connections. The software does not delete the mating reducer and generates a To Do Record for the reducer. You must have Write access to the reducer to update the To Do Record.



No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Working	Read-only
3	Mating flanges associated with the branch run		
4	Component associated with the branch run		

Result: If you delete the header, the software deletes the header, including mating flange, all associated objects and connections.



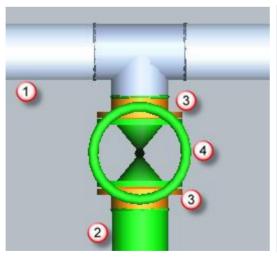


Before deletion

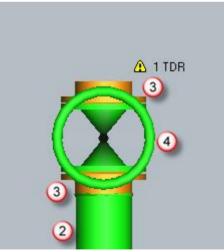
After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Non-working	Full control/ Write
3	Mating flanges associated with the branch run		
4	Component associated with the branch run		

Result: If you delete the header, the software deletes the header, including all associated objects and connections. The software does not delete the mating flange and generates a To Do Record for the reducer. You must have Write access to the mating flange to update the To Do Record.







After deletion

See Also

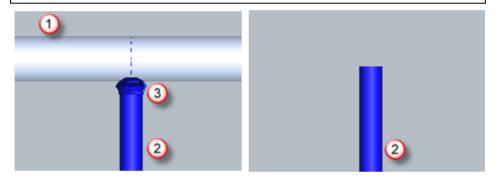
Deleting branch run at tee connection (on page 252)
Deleting header run at Olet, Stub-in or Tap connections (on page 260)
Deleting a branch run at Olet, Stub-in, or Tap connections (on page 255)

Deleting header run at Olet, Stub-in or Tap connections

NOTE The following behavior applies to all types of olets, reinforcing pad and reinforcing weld parts, stub-in and tap connections.

No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Working	Read-only
3	Olet associated with the branch run		

Result: If you delete the header, the software deletes the header, including olet and all associated connections.

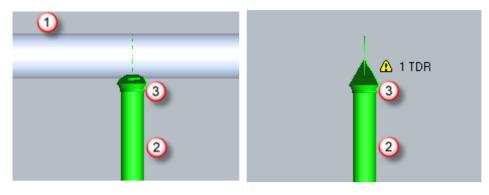


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Non-working	Full control/ Write
3	Olet associated with the	branch run	

Result: If you delete the header, the software deletes the header, including olet and all associated connections. The software does not delete the olet, and generates a To Do Record for the olet. You must have Write access to the olet to update the To Do Record.

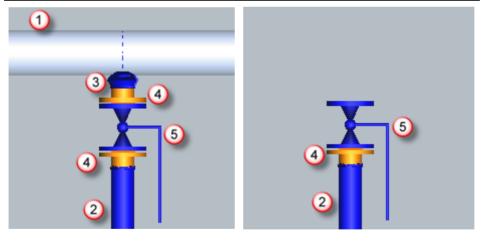


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Working	Read-only
3	Olet associated with the branch run		
4	Mating flanges associated with the branch run		
5	Component associated v	vith branch run	

Result: If you delete the header, the software deletes the header, including olet, mating flange and associated connections.

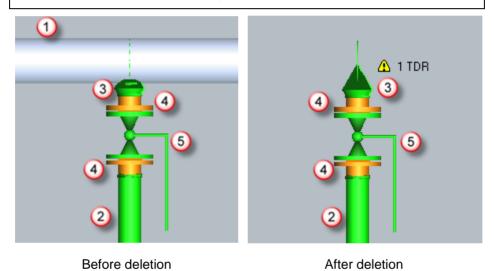


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Header run	Working	Full control/ Write
2	Branch run	Non-working	Full control/ Write
3	Olet associated with the branch run		
4	Mating flanges associated with the branch run		
5	Component associated with	n branch run	

Result: If you delete the header, the software deletes the header, including all associated connections. The software does not delete the olet, and generates a To Do Record for the olet. You must have Write access to the olet to update the To Do Record.



See Also

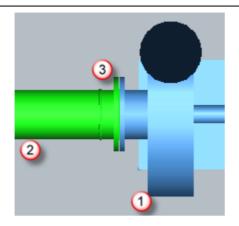
Deleting a branch run at Olet, Stub-in, or Tap connections (on page 255) Deleting branch run at tee connection (on page 252) Deleting header run at tee connection (on page 257)

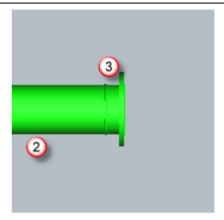
Equipment to pipe run connections

Flanged Connections

No.	Route Object	Approval Status	Permission Group Access
1	Equipment	-	Read-only
2	Pipe run	Non-working	Full control/ Write
3	Base flange associated	with the pipe run	

Result: If the equipment is deleted, the software deletes the equipment, including all associated connections with the pipe run.



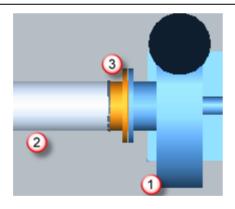


Before deletion

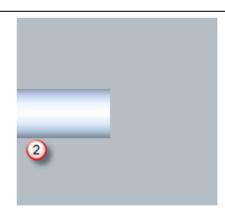
After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Equipment	-	Read-only
2	Pipe run	Working	Full control/ Write
3	Mating flange associated	d with the pipe run	

Result: If the equipment is deleted, the software deletes the equipment, including the mating flange and all associated connections with the pipe run.



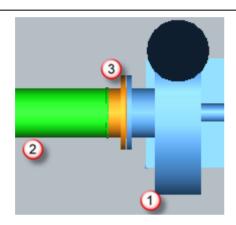


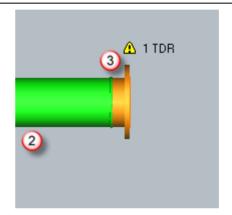


After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Equipment	-	Read-only
2	Pipe run	Non-working	Full control/ Write
3	Mating flange associated	d with the pipe run	

Result: If the equipment is deleted, the software deletes the equipment, including all associated connections with the pipe run. The software generates a To Do Record for the mating flange, because it is in non-working state. You must have Write access to the mating flange to update the To Do Record.



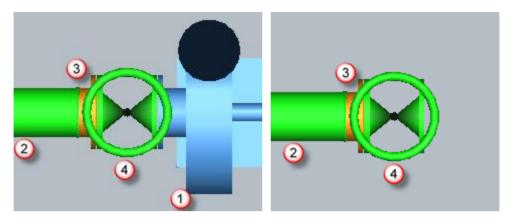


Before deletion

After deletion

Write		
Mating flange associated with the pipe run		
Component associated with the pipe run		
-		

Result: If the equipment is deleted, the software deletes the equipment, including all associated connections with the pipe run.



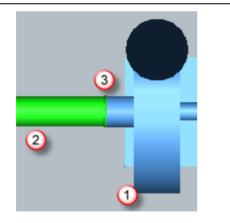
Before deletion

After deletion

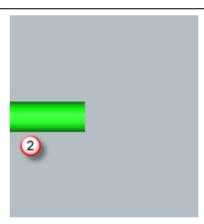
Welded Connections

No.	Route Object	Approval Status	Permission Group Access
1	Equipment	-	Read-only
2	Pipe run	Non-working	Full control/ Write
3	Welded connection		

Result: If the equipment is deleted, the software deletes the equipment, including all associated connections with the pipe run.



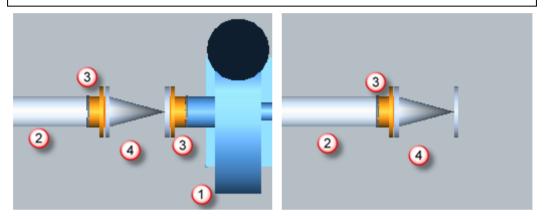




After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Equipment	-	Read-only
2	Pipe run	Working	Full control/ Write
3	Mating flanges associated with the pipe run		
4	Component associated with the	ne pipe run	

Result: If the equipment is deleted, the software deletes the equipment, including all associated connections with the pipe run.

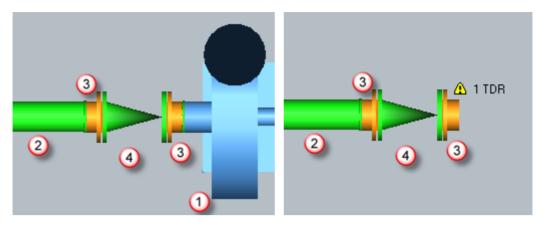


Before deletion

After deletion

No.	Route Object	Approval Status	Permission Group Access
1	Equipment	-	Read-only
2	Pipe run	Non-working	Full control/ Write
3	Mating flanges associated w	rith the pipe run	
4	Component associated with	the pipe run	

Result: If the equipment is deleted, the software deletes the equipment, including all associated connections with the pipe run. The software generates a To Do Record for the mating flange, because it is in non-working state. You must have Write access to the mating flange to update the To Do Record.



Before deletion

After deletion

See Also

Pipe run to pipe run connections (on page 246) Header to branch connections (on page 252)

APPENDIX C

Appendix: Property Dialog Boxes

This appendix contains reference information for all the property dialog boxes in the Piping task.

In This Appendix

Common Property Tabs	. 268
Pipe Branch Feature Properties Dialog Box	. 278
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Reference 3D Piping Instrument Properties Dialog Box	. 323
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Common Property Tabs

The software displays some common property tabs on the properties dialog boxes for all piping objects. Instead of repeatedly listing the common tabs with each piping object property dialog box, they are documented here for easy reference.

Configuration Tab (on page 269) Connections Tab (on page 270) Definition Tab (on page 270) Notes Tab (on page 271) Occurrence Tab (on page 272) Relationship Tab (on page 278)

Configuration Tab

Displays the creation, modification, and status information about an object.

NOTE You cannot define the filters using the Configuration tab.

Plant

Displays the name of the model. You cannot change this value.

Permission Group

Specifies the permission group to which the object belongs. You can select another permission group, if needed. Permission groups are created in Project Management.

Transfer

Reassigns ownership of the selected model objects from their current permission group to another satellite or host permission group. This option is only available if the active model or project is replicated in a workshare configuration. The option is not available if all of the objects in the select set already belong to another location and are non-transferable. For more information, see *Transfer Ownership Dialog Box* in the *Common User's Guide*.

NOTE The **Transfer** option does not apply to the filters and surface style rules.

Approval State

Specifies the current status of the selected object or filter. The display depends on your access level. You might be unable to change the status of the object. The list is defined by the ApprovalStatus codelist.

NOTE You can only edit or manipulate an object with a status of Working.

Status

Specifies the location of the object in the workflow process. Changing this property sets the **Approval State**. The list is controlled by the ApprovalReason codelist in the ApprovalReason.xls file. You must bulkload this file. For more information, see *ApprovalReason* in the *Reference Data Guide*.

Date Created

Specifies the creation date of the object.

Created by

Specifies the name of the person who created the object.

Date Last Modified

Specifies the date when the object was last modified.

Last Modified by

Specifies the name of the person who last modified the object.

Transfer Ownership Dialog Box

Allows you to specify a new location and permission group for the selected model objects.

Current location

Displays the name of the location with which the current permission group is associated. All of the objects in the select set must belong to the same location.

Current permission group

Displays the name of the permission group with which the selected objects are currently associated. If all of the objects in the select set do not belong to the same permission group, this box appears blank.

New location

Specifies the name of the location to which you want to assign the objects. In a global workshare configuration, this box lists all the locations in which you have write access to one or more permission groups. The selection in this box filters the entries in the **New permission group** box.

New permission group

Specifies the new permission group to which to assign the selected objects. If you specify a value in the **New location** box, this list displays all permission groups to which you have write access in the selected location. If you do not specify a value in the **New location** box, this list includes all permission groups to which you have write access in all locations except the current location. This box is blank if you do not have write access to any permission groups at any locations other than the current one.

NOTE We strongly recommend that administrators follow naming convention rules that include the location as a prefix in the permission group name.

Connections Tab

Displays the connection information for the object, the properties and their values, as defined in the reference data. For more information about the information defined in the reference data, see the *Piping Reference Data Guide*.

Connector

Select the connector for which you want to view properties.

Property

Displays the name of the property as defined in the reference data.

Value

Displays the value of the corresponding property.

Definition Tab

The **Definition** tab displays the object properties as they are defined in the reference data. The property name appears on the left side of the grid and the corresponding property value appears on the right side of the grid. If you select more than one object and then view the properties, only the common properties between the selected objects appear.

The properties that appear depend on what you defined in the reference data. Refer to the *Piping Reference Data Guide* for more information on the properties.

Notes Tab

Creates and edits user-definable text placed by the designer on an object in the model. The notes provide special instructions related to the object for the fabricator and are available in downstream tasks. For example, the notes appear in two-dimensional drawings and within design review sessions.

NOTE Only one note of a given kind from a given object can be shown on a drawing. For example, if there are two fabrication notes on a piping part, then only one of the notes shows on the drawing. It is important to know about and to consider this situation when defining notes on an object in the modeling phase. For example, you can display one Fabrication note and one Installation note by defining two separate labels for the two kinds of notes.

Key point

Specifies the key point on the object to which you want to add a note.

Notes at this location, listed by name

Lists all notes for the selected key point on the object.

Date

Displays the date that the note was created. The system automatically supplies the date.

Time

Displays the time that the note was created. The system automatically supplies the time.

Purpose of note

Specifies the purpose of the note.

Author

Displays the login name of the person who created the note. The system automatically supplies this information. You cannot change this information.

Note text

Defines the note text. The software does not limit the length of the note text.

Show dimension

Indicates that the note generates a dimension.

If you are displaying the properties for a Support component, then a dimension can be included for the component in the Support drawings, if you select the **Show dimension** option. The note must be associated with one of the key points for the Support component. It is recommended that you set the **Purpose of note** as **Fabrication**, but this is not a requirement. The note **Name** and **Note text** are not used when you select this option.

New Note

Creates a new note on the object.

Standard Note

Displays a list of standard notes from which you can select. This feature is not available in this version.

Highlight Note

Highlights the note in the graphic view so that you can easily find the note and the object to which it is related. This feature is not available in this version.

Delete Note

Deletes the currently displayed note.

Occurrence Tab

Displays instance-specific information about the object.

■ NOTES

- Import Default Flange Properties, and Drive Selection by Generic Port Data are only available when you are editing the properties of on-the-fly instrument or specialty instrument object.
- If you select multiple objects, then Import Default Flange Properties and Drive Selection by Generic Port Data are unavailable.

Category

Select the properties that you want to view for the object. Piping object properties are divided into different categories: **Standard**, **Weight and CG**, **Fabrication and Construction**, **Bend Data**, and **Port n**.

■ NOTE Port n category is only available when you are editing port properties of on-the-fly instrument or specialty instrument object. If you select multiple objects, then this category is unavailable.

ቴ Import Default Flange Properties

Applies default flange port properties for the selected specialty instrument. If you click this command, the current flange port properties are replaced with corresponding generic port data as defined in the Catalog.

Standard

Displays all the occurrence properties for the part as defined in the reference data. If the table is blank, the object for which you are viewing properties does not have any occurrence properties defined for it in the reference data. Not all standard category properties defined here are available on every part type. For example, the cold spring length property is only available on pipe parts. For more information about occurrences defined in the reference data, see the *Piping Reference Data Guide*.

Name

Specifies the name of the object.

Name Rule

Displays how the object was named. If set to **Default Name Rule**, the software named the object using the default naming rule. If set to **User Defined**, you, or someone else, named the object manually.

Pipe Run

Displays the name of the parent pipe run to which the object belongs. This field is read-only.

Type

Displays the object's short code. The list of available short codes is based on the piping specification and nominal diameter of the object selected along with the geometry at the insertion location.

Option

Displays a list of options that you can use instead of the selected object. If no options exist, this field just displays **Default**. The **Option** list contains any options defined in the piping specification for the short code selected in the **Type** list. For example, if you are looking at a valve part, the **Option** list contains other valve parts, such as one with a higher pressure rating, that you can use here. Selecting a value from the **Option** list updates the object.

Tag

Displays the engineering tag if one is assigned.

Base/Mating Part

Displays whether the selected object is a base part or a mating part. If the object is a mating part, you can use this option to change the object to a base part. Use caution however, because after a mating part has been changed to a base part, it cannot be changed back to a mating part again.

Modeled Length

Specifies the length of the object as it is modeled.

Cut Length

Specifies the cut length of the pipe. Smart 3D calculates the cut length using the following formula:

```
Cut Length = Modeled Length + Field Fit Length End 1 + Field Fit Length End 2 + Flared Lap Length End 1 + Flared Lap Length End 2 - Pipe Bend Elongation - Cold Spring Length + Bend Grip Length + Bend Pull Length
```

It is possible that the field fit lengths, the flared lap lengths, and the bending elongation, grip, and pull lengths are not applicable to the cut length calculation for a given pipe. In that case, Smart 3D ignores them for that pipe.

Field Liner Thickness

Specifies the field liner thickness if a liner is defined.

Cold Spring Length

Specifies the cold spring length to subtract from the cut length. A positive value makes the **Cut Length** value smaller. The cold spring length refers to intentionally cutting a pipe short and then pulling the assembled pipeline to the connection point. Because of this, there is spring in the pipe until the pipe reaches operating temperature. At that point, there is theoretically no stress on the pipe or the connection.

Reporting Requirement

Select the reporting requirements for the object. You can specify that the object is reported or not reported. An example of an object that you may not want reported is a spacer for a valve. You have to order the valve, but the spacer comes with the valve and does not need to be ordered.

Reporting Type

Select the reporting type. The options that are available here depend on what you select for the **Reporting Requirement**.

Rotation

Specifies the rotation angle of the object.

Stress System Number

Specifies the stress system number for the part.

Isometric Sheet Number

Specifies the isometric sheet number for the part. This property is used in conjunction with **Group Pipe Parts** (on page 178) in Piping.

Sequence ID

Specifies the object sequence ID.

Branch Reporting Ownership Type Basis

Specifies who set the branch reporting ownership. This could be a user or Smart 3D. This option is used by the software when an administrator synchronizes the model with the catalog. The list is defined by the FabricationTypeBasis codelist.

Angle

Displays the angle of the part.

Weight and CG

Displays the center-of-gravity and the weight of the selected object. The center-of-gravity locations are displayed relative to the active coordinate system along the X-, Y-, and Z-axes. The weight value that is displayed in the properties dialog box is calculated as the material density multiplied by the object's solid volume. Therefore, the material of the object affects the weight value that is displayed here. Check the material assigned to the object if the weight displayed is an improbable value. For the most accurate weight calculation, use the **Tools > Run Reports** command.

Dry Weight

Specifies the dry weight of the object.

Wet Weight

Specifies the wet weight of the object.

■ NOTE The Wet Weight is the sum of Dry Weight and the weight of the fluid inside a piping object. The dry weight and fluid weight values are catalog values entered on the part sheet for the object.

Dry CG X

Specifies the X-axis location of the dry center-of-gravity.

Dry CG Y

Specifies the Y-axis location of the dry center-of-gravity.

Dry CG Z

Specifies the Z-axis location of the dry center-of-gravity.

Wet CG X

Specifies the X-axis location of the wet center-of-gravity.

Wet CG Y

Specifies the Y-axis location of the wet center-of-gravity.

Wet CG Z

Specifies the Z-axis location of the wet center-of-gravity.

Dry WCG Origin

Specifies the way in which the dry weight center-of-gravity location is defined. The list is defined by the WCGOrigin codelist.

Computed indicates that the software calculates the origin location.

Defined indicates that you want to manually define the dry weight center-of-gravity location relative to the active coordinate system. **Wet WCG Origin**

Specifies the way in which the wet weight center-of-gravity location is defined. The list is defined by the WCGOrigin codelist.

Computed indicates that the software calculates the origin location.

Defined indicates that you want to manually define the wet weight center-of-gravity location relative to the active coordinate system. Fabrication and Construction

Fabrication Requirement

Specifies the fabrication requirement for the object. To change the options on the list, edit the **Fabrication Type** select list in Catalog.

Fabrication Type

Specifies the type of fabrication for the object. To change the options on the list, edit the **Fabrication Type** select list in Catalog.

Construction Requirement

Specifies the construction requirement for the object. To change the options on the list, edit the **Construction Requirement** select list in Catalog.

Construction Type

Specifies the type of construction for the object. To change the options on the list, edit the **Construction Type** select list in Catalog.

Bend Data

■ NOTE The Bend Data category is only available if the administrator has bulkloaded the Pipe Bending Manufacturability Rules.xls workbook, and you are viewing properties of a pipe part with bends defined.

Minimum Length Check

Set this option to **True** if you want the software to validate pipe bending manufacturability rules for the selected pipe part.

Bend Type

Defines the pipe bend type.

Preferred Bending Machine

Displays the name of the preferred bending machine as defined in the reference data.

Minimum Tangent Data Set

Select the set of minimum tangent lengths to use with this pipe bend configuration.

End Trimming

Specify whether or not ends are trimmed.

Grip Length

Defines the grip length.

Pull Length

Defines the pull length.

Number of Bends in Piece

Displays the number of bends in the pipe part.

Number of Tangents in Piece

Displays the number of tangents in the pipe part.

Port n

This category is only available when you are editing port properties of an on-the-fly instrument or specialty instrument objects. **n** represents the number of ports of the selected object. For example, when you work with an object that has two ports, then the Category list displays **Port 1** and **Port 2** categories. Select a category to specify the port data for the selected port of that object. The software displays the properties of Port 1 if you select the **Port 1** category, and so forth.

NOTE Use **Import Default Flange Properties** to replace the current flange port properties with corresponding generic port data as defined in the Catalog.

The following properties are logically related and are prioritized in the order they display. **Nominal Diameter n**, **NPD Unit n**, and **Termination Class n** have the highest priority. For example, you can specify a value for **End Preparation 1**. If **Drive Selection by Generic Port Data** is selected, then the software automatically filters and updates the remaining properties with corresponding generic port data as defined in the Catalog.

Port ID n

Specifies a description of the port.

Nominal Diameter n

Specifies the nominal size of the selected port.

NPD n Unit

Specifies the units for the **NPD** value. For example, type **mm** or **in**.

Termination Class n

Specifies the termination class for the part port.

Termination Sub Class n

Specifies the termination sub-class for the port.

End Preparation n

Specifies the end preparation code for the part port. To change the options on the list, edit the **End Preparation** select list in Catalog.

Schedule Practice n

Specifies the schedule practice short description or code for the part port. To change the options on the list, edit the **Schedule Practice** select list in Catalog.

Schedule Thickness n

Specifies the schedule thickness short description or code for the part port. To change the options on the list, edit the **Schedule Thickness** select list in Catalog.

End Practice n

Specifies the end practice for the object. To change the options on the list, edit the **End Standard** select list in Catalog.

End Standard n

Specifies the end standard code for the part port. To change the options on the list, edit the **End Standard** select list in Catalog.

Rating Practice n

Specifies the rating practice for the nozzle.

Pressure Rating n

Specifies the pressure rating code for the part port. Valid codes are listed in the **AllCodeLists.xls** workbook on the **Pressure Rating** sheet in the **Codelist Number** column.

Flow Direction n

Specifies the flow direction code for the port. Specifying the correct flow direction code for each part port is very important because the software automatically orients the part to the flow direction of the pipe or port to which the part is connected. To change the options on the list, edit the **Flow Direction** select list in Catalog.

Piping Point Basis n

Specifies the purpose of the port, such as a vent or a drain, inlet or an outlet, tap by system or by user, jumper or jacket, and so forth. Select an appropriate value from the list.

Drive Selection by Generic Port Data

Filters and lists valid property values as per generic port data defined in the Catalog. This option is selected by default. We recommended that you leave this option selected. If you clear this option, the software does not filter port values and lists all the available values.

You can specify any value. However this can result in errors due to data mismatch. The combination of property values specified might be inappropriate for the port as per the generic port data defined in the Catalog.

See Also

Common Property Tabs (on page 268)

Relationship Tab

Displays all objects related to the selected object for which you are viewing properties. For example, if you are viewing the properties of a pipe run, the related pipeline, features, parts, associated control points, hangers or supports, and equipment display on this tab. All WBS assignments, including project relationships, appear on this tab.

Additional examples for marine relationships are as follows:

- For plate and profile system properties, the related bounded objects, bounding objects, and connections are shown.
- For plate and profile system part properties, parent systems are shown.
- For assembly connection properties, all connected objects are shown.
- For the properties of a frame connection on a member, supported, supporting, and auxiliary supporting parts are shown.
- For split connection properties, the parent and auxiliary supporting parts are shown.

Name

Specifies the name of the object.

Type

Specifies the type of object. To change the options on the list, edit the **Weld Type** select list in Catalog.

Go To

Displays the properties of the selected object.

Pipe Branch Feature Properties Dialog Box

Displays tees and other branch properties for review and editing.

See Also

General Tab (Pipe Branch Feature Properties Dialog Box) (on page 278) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Pipe Branch Feature Properties Dialog Box)

Displays and defines the general properties of the selected branch feature.

NOTE Branch features inherit some properties from the parent pipe run. If you change the pipe run property, the corresponding branch properties also automatically change.

Pipe branch feature properties are divided into several different categories: **Standard**, **Insulation and Tracing**, and **Surface Treatment and Coating**. Select the category that you want to define values for by using the **Category** option.

Standard

Pipeline

Displays the name of the parent pipeline. This property is read-only.

Pipe Run

Specify the pipe run to which the branch belongs. Other pipe runs in the same pipeline as the original pipe run appear for selection.

Specification

Specify the active pipe specification for the branch. All the pipe specifications that are allowed for the System parent of the pipe run display for selection. If appears in the box, the pipe specification is inherited from the pipe run to which the branch belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run Specification**.

Nominal Diameter

Specify the nominal diameter (NPD) of the branch. If appears in the box, the NPD for the turn is inherited from the pipe run to which the branch belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run NPD**. If you have manually selected the part, the NPD of the selected part appears and cannot be changed.

Type

Displays the types of branches allowed by the selected **Specification** and **Nominal Diameter**. You can select a branch type from the following types: **Tee <Pipe Spec Rule>**, **Latrolet**, **Sockolet**, **Weldolet**, and **Tee**.

Option

Displays a list of available branches. The software generates this list based on the pipe specification, the NPD, and the branch type you selected in the **Type** box.

Base Part Name

Displays the part name for the branch. The part number is selected by the software using the pipe specification guidelines. This property is read-only.

Insulation and Tracing

Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation

specification.

Insulation Purpose

Displays the purpose of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, the information in this box cannot be changed. However, if **Insulation Specification** is manually defined, select the purpose of the insulation in this box. Available purposes are read from the reference data.

Insulation Material

Specifies the material of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, this field cannot be changed. However, if **Insulation Specification** is manually defined, select the insulation material from those available from the reference data.

The list contains the last five insulation materials selected. Click **More** to browse the catalog for the insulation material to use. If you set this field to **Not Insulated**, the **Insulation Thickness** field is disabled. If you set this field to **Use Run Material**, the along leg feature inherits the insulation material from the duct run.

To change the options on the list, edit the Insulation Material select list in Catalog.

Insulation Thickness

Specification box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of temperature (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius, for example).

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

See Also

Pipe Branch Feature Properties Dialog Box (on page 278)

Connection Properties Dialog Box

Displays connection properties for review and editing. Use the **Relationships** tab to view the properties of the bolts, gaskets, washers, nuts, welds, and other information about the connections.

The ownership assignment of connection items (such as welds, gaskets, bolts, and so forth) is done through a hard-coded rule. Components have higher priority for ownership than stock-parts (such as pipes). Between components, base-parts have higher priority (for example, bolts and gaskets get assigned to a valve instead of the mating flanges). If both the parts are equal in priority, the connection is between two pipes or the flange has been inserted explicitly therefore both flange and valve are base-parts, the owner is determined by the X, Y and Z coordinates of the two connected parts. The part that has the lower XYZ coordinates will be the owner.

General Tab (Connection Properties Dialog Box) (on page 282) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Connection Properties Dialog Box)

Displays and defines the general properties of the selected connection.

Category

Select the properties that you want to see. You can view system properties or user-defined properties.

Pipeline

Displays the pipeline to which the connection belongs. You cannot change this value.

Connected Type

Displays the type of connection. You cannot change this value.

See Also

Connection Properties Dialog Box (on page 282)

Pipe Bolt Set Properties Dialog Box

Displays bolt set properties for review and editing.

Occurrence Tab (on page 272)
Definition Tab (on page 270)
Configuration Tab (on page 269)
Relationship Tab (on page 278)

Pipe End Feature Properties Dialog Box

Displays end feature properties for review and editing.

General Tab (Pipe End Feature Properties Dialog Box) (on page 283) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Pipe End Feature Properties Dialog Box)

Displays and defines the general properties of the selected end feature.

Pipe end feature properties are divided into different categories: **Standard**, **Insulation and Tracing**, and **Surface Treatment and Coating**. Select the category to define values in the **Category** option.

Standard

Pipeline

Displays the pipeline system to which the end feature belongs. You cannot change the pipeline of the end feature.

Pipe Run

Displays the pipe run to which the end feature belongs. You cannot change the pipe run of the end feature.

Specification

Specify the active pipe specification for the end feature. All pipe specifications that are allowed for the pipeline display for selection. If appears in the box, the pipe specification is inherited from the pipe run to which the end feature belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run Specification**.

Nominal Diameter

Specify the nominal diameter (NPD) of the end feature. If appears in the box, the NPD for the end feature is inherited from the pipe run to which the end feature belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use**

Run NPD. If you have manually selected the part, the NPD of the selected part appears and cannot be changed.

Type

Displays the types of end features allowed by the selected **Specification** and **Nominal Diameter**. End features are listed by short codes. You can change the end feature type if needed. If you have manually selected the part from the catalog, this box displays **Part selected manually** and cannot be changed.

Option

Displays a list of available end features. The software generates this list based on the pipe specification, the NPD, and the short code you selected in the **Type** box. If you have manually selected the part from the catalog, this box displays **Part selected manually** and cannot be changed.

Base Part Name

Displays the part name for the end feature. The part name is selected by the software using the pipe specification guidelines. Select **Select Manually** to override the pipe specification, and select the part number from the catalog. If you select a part manually, the **Nominal Diameter**, **Type** and **Option** properties are disabled.

NOTE The **Select Manually** option may not be available. It is enabled and disabled in the reference data.

Correlation Status

Specifies whether or not the object has been correlated to an object in a P&ID. The list is defined by the EFWCorrelationStatus select list.

Correlation Basis

Specifies whether or not the object is correlated to a P&ID object. The list is defined by the EFWCorrelationBasis select list.

Correlate Object indicates that the object has a correlating object in a P&ID.

No correlation is required indicates that the object does not have a correlating object in a P&ID. **Correlation Approval Status**

Specifies whether or not the object is approved with discrepancies in the three-dimensional data compared with design basis data. The list is defined by the EFWCorrelationApprovalStatus sheet in the AllCodelist workbook.

Topology mismatch approved indicates that the object topology mismatch can be ignored.

Data and Topology mismatches approved indicates that the object data and topology mismatches can be ignored.

None indicates that you do not approve a mismatch.Insulation and Tracing

Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Displays the purpose of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, the information in this box cannot be changed. However, if **Insulation Specification** is manually defined, select the purpose of the insulation in this box. Available purposes are read from the reference data.

Insulation Material

Specifies the material of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, this field cannot be changed. However, if **Insulation Specification** is manually defined, select the insulation material from those available from the reference data.

The list contains the last five insulation materials selected. Click **More** to browse the catalog for the insulation material to use. If you set this field to **Not Insulated**, the **Insulation Thickness** field is disabled. If you set this field to **Use Run Material**, the along leg feature inherits the insulation material from the duct run.

To change the options on the list, edit the **Insulation Material** select list in Catalog.

Insulation Thickness

Specifies the thickness of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of

temperature (K for Kelvin, F for Fahrenheit, or C for Celsius, for example).

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

See Also

Pipe End Feature Properties Dialog Box (on page 283)

Pipe Gasket Properties Dialog Box

Displays gasket properties for review and editing.

Occurrence Tab (on page 272) Configuration Tab (on page 269) Definition Tab (on page 270) Relationship Tab (on page 278)

Pipe Part Properties Dialog Box

Displays properties for pipe parts for review and editing.

Occurrence Tab (on page 272)
Definition Tab (on page 270)
Connection Properties Dialog Box (on page 282)
Configuration Tab (on page 269)
Relationship Tab (on page 278)
Notes Tab (on page 271)

Pipe Run Properties Dialog Box

Displays pipe run properties for review and editing.

Edit Pipe Run Properties (on page 118) General Tab (Pipe Run Properties Dialog Box) (on page 288)

General Tab (Pipe Run Properties Dialog Box)

Displays and defines the general properties of the selected pipe run.

NOTE Because pipe run properties are customizable in the piping reference data, only the properties that are required by the software are documented.

Pipe run properties are divided into several different categories: **Standard**, **Testing**, **Temperature and Pressure**, **Surface Treatment and Coating**, **Insulation and Tracing**, and **Responsibility**. Select the category that you want to define values for by using the **Category** option.

Standard

Pipeline

Select the pipeline system to which you want the pipe run to belong. The last pipeline system that you selected is the default. Select **More** to display all defined pipeline systems. You can create a new pipeline in the Systems and Specifications task.

Name

Displays the name of the pipe run. The pipe run name is based on the **Name Rule** selection. If you specify a name in this box, the software automatically sets the **Name Rule** box to **User Defined**.

Name Rule

Specify the naming rule to name the pipe run. You can select one of the listed rules or specify the pipe run name yourself in the **Name** box.

Specification

Select the pipe specification for the pipe run. Only those pipe specifications that are allowed in the pipeline that you selected appear in the list. You can assign pipe specifications to pipeline systems in the System and Specifications task. You can define pipe specifications in the reference data. See the *Piping Reference Data Guide* for more information on defining pipe specifications.

Nominal Diameter

Specifies the nominal pipe diameter (NPD) to use for this pipe run. The pipe specification controls the available NPDs in this list. If you select an equipment nozzle as the starting point of your pipe run, the software automatically uses the NPD of the nozzle as the NPD of the pipe run. You can select the NPD units to display on a session file basis using the **Tools** > **Options** command on the **Units of Measure** tab.

Flow Direction

Select the flow direction for the pipe run. If you select an equipment nozzle as the starting point of your pipe run, the software automatically uses the flow direction of the nozzle as the flow direction of the pipe run.

Pipe Run Type

Specifies the type of pipe run that is routed. The default value is **Undefined** for a non-jacketed pipe run. Select **Core Pipe Run** to route a core pipe run. Select **Jacket Pipe Run** to route a jacketed pipe run. This property is used to differentiate a core pipe run and a jacketed pipe run.

Minimum Slope

Specifies the minimal slope value for the pipe run. You can specify the slope as a ratio, a percentage, or in degrees.

ratio - If a run drops 1/4" for every foot of horizontal distance, specify the slope as 1/4"/1'-0".

percentage - If a run drops 1" for every 10" of horizontal distance, specify the slope as **10%**. **degrees** - A five-degree slope can be specified as **5deg**.

NOTE When routing a sloped pipe, use a slope value that is larger than the **Minimum Slope** for the pipe run to avoid *Invalid Slope Angle* To-Do-Record (TDR). The software compares design slope and minimum slope of the pipe run. If there is a difference between the values caused by any modification, the software generates a TDR.

Slope Direction

Displays the direction type of the pipe run slope. If it is set to **Single**, the pipe run slopes either up or down. You can change this to **Multiple** if needed. If it is set to **Multiple**, the pipe run can slope both up and down. You cannot change this setting back to **Single** once **Multiple** is selected.

Schedule Override

Specifies the thickness override for parts in the pipe run. If the piping specification rules do not allow you to override components, then the software disables this option. To change the options on the list, edit the **Schedule Thickness** select list in Catalog.

Correlation Status

Specifies whether or not the object has been correlated to an object in a P&ID. The list is defined by the EFWCorrelationStatus select list.

Correlation Basis

Specifies whether or not the object is correlated to a P&ID object. The list is defined by the FFWCorrelationBasis select list.

Correlate Object indicates that the object has a correlating object in a P&ID.

No correlation is required indicates that the object does not have a correlating object in a P&ID. **Correlation Approval Status**

Specifies whether or not the object is approved with discrepancies in the three-dimensional data compared with design basis data. The list is defined by the EFWCorrelationApprovalStatus sheet in the AllCodelist workbook.

Topology mismatch approved indicates that the object topology mismatch can be ignored.

Data and Topology mismatches approved indicates that the object data and topology mismatches can be ignored.

None indicates that you do not approve a mismatch. Testing

Testing Requirements

Specifies the type of non-destructive testing required for welds. To change the options on the list, edit the **Testing Type** select list in Catalog.

Testing Type

Specifies the type of non-destructive weld testing for the welds. To change the options on

the list, edit the **Testing Type** select list in Catalog.

Testing Percentage

Specifies the percentage of the welds on this pipe run that are to be tested. This option is available only if you are viewing pipe run properties.

Temperature and Pressure

★ IMPORTANT

- Temperature and pressure values are controlled by UndefinedServiceLimitsruleOpt, which is available on the DefaultProjectOptions sheet in the Piping Specification.xls workbook. If this option is set to 5, then you must specify temperature and pressure values for all the pipe runs. If this option is set to 10, the software displays a warning: "No Temperature and pressure data has been defined for the pipe run being modeled. As a result, compliance with the temperature/pressure service limits as defined in the piping specification cannot be confirmed. Do you want to continue modeling the pipe run anyway?"
- If your pipe specifications are material-driven, it is still recommended that you specify at least one set of temperature and pressure values for the pipe run.

Design Maximum Temperature

Specifies the maximum design temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Design Minimum Temperature

Specifies the minimum design temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Design Maximum Pressure

Specifies the maximum design pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Operating Maximum Temperature

Specifies the maximum operating temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Operating Minimum Temperature

Specifies the minimum operating temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Operating Maximum Pressure

Specifies the maximum operating pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Testing Maximum Temperature

Specifies the maximum testing temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Testing Minimum Temperature

Specifies the minimum testing temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Testing Maximum Pressure

Specifies the maximum testing pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Design Minimum Pressure

Specifies the minimum design pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Operating Minimum Pressure

Specifies the minimum operating pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Testing Minimum Pressure

Specifies the minimum testing pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

Insulation and Tracing

Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Specification box, you cannot change the information in the **Insulation Purpose** box. However, if **Insulation Specification** is manually defined, you can select the purpose of the insulation in this box. If **Insulation Specification** is a selected reference data insulation specification, the software reads the purpose from the insulation specification from the reference data and displays it here.

To change the options on the list, edit the **Insulation Purpose** select list in Catalog.

Insulation Material

Specifies the material of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Material** box. However, if **Insulation Specification** is manually defined, you can select the insulation material to use. If **Insulation Specification** is a selected reference data insulation specification, the software reads the material from the insulation specification as defined in the reference data and displays it here.

Select **More** to select an insulation material from the Catalog. To change the options on the list, edit the **Insulation Material** select list in Catalog.

Insulation Thickness

Specifies the thickness of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of temperature (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius, for example).

Responsibility

Cleaning Responsibility

Specifies the party responsible for cleaning the object. To change the options on the list, edit the **Cleaning Responsibility** select list in Catalog.

Design Responsibility

Specifies the party responsible for designing the object. To change the options on the list, edit the **Design Responsibility** select list in Catalog.

Fabrication Responsibility

Specifies the party responsible for fabricating the object. To change the options on the list, edit the **Fabrication Responsibility** select list in Catalog.

Installation Responsibility

Specifies the party responsible for installing the object. To change the options on the list, edit the **Installation Responsibility** select list in Catalog.

Painting Responsibility

Specifies the party responsible for painting the object. To change the options on the list, edit the **Painting Responsibility** select list in Catalog.

Requisition Responsibility

Specifies the party responsible for ordering the object. To change the options on the list, edit the **Requisition Responsibility** select list in Catalog.

Supply Responsibility

Specifies the party responsible for delivering the object. To change the options on the list, edit the **Supply Responsibility** select list in Catalog.

Testing Responsibility

Specifies the party responsible for testing on the object. To change the options on the list, edit the **Testing Responsibility** select list in Catalog.

See Also

Pipe Run Properties Dialog Box (on page 287)

Pipe Straight Feature Properties Dialog Box

Displays straight feature properties for review and editing.

Edit Straight Pipe Properties (on page 119) General Tab (Pipe Straight Feature Properties Dialog Box) (on page 294) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Pipe Straight Feature Properties Dialog Box)

Displays and defines the general properties of the straight feature.

NOTE Straight features inherit some properties from the parent pipe run. If you change the pipe run property, the corresponding straight properties also change automatically.

Pipe run properties are divided into different categories: **Standard**, **Insulation and Tracing**, and **Surface Treatment and Coating**. You select which category that you want to define values for by using the **Category** option.

Standard

Pipeline

Displays the system to which the straight feature belongs. You cannot change the system of the straight feature.

Pipe Run

Specifies the pipe run to which the straight feature belongs. Other pipe runs in the same pipeline as the original pipe run appear for selection.

Specification

Specify the active pipe specification for the straight feature. All pipe specifications that are allowed for the System parent of the pipe run appear for selection. If appears in the box, the pipe specification is inherited from the pipe run to which the straight feature belongs. If the icon does not appear and you want to use the pipe specification from the pipe run, select **Use Run Specification**.

Nominal Diameter

Specify the nominal diameter (NPD) of the straight feature. If appears in the box, the NPD for the straight feature is inherited from the pipe run to which the straight feature belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run NPD**. If you have manually selected the part, the NPD of the selected part appears and cannot be changed.

Type

Displays the types of straight features allowed by the selected **Specification** and **Nominal Diameter**. Straight features are listed by short codes. You can change the straight feature type if needed. If you have manually selected the part, this box displays **Part selected manually** and cannot be changed.

Option

Displays a list of available straight features. The software generates this list based on the pipe specification, the NPD, and the short code that you selected in the **Type** box. If you have manually selected the part, this box displays **Part selected manually** and cannot be changed.

Base Part Name

Displays the part name for the straight feature. The software selects the part number using the pipe specification guidelines. Choose the **Select Manually** option to override the pipe specification, and select the part number from the catalog. If you select a part manually, the **Nominal Diameter**, **Type** and **Option** properties are disabled.

Length

Displays the length of the straight feature. You cannot change the length of the straight feature.

Insulation and Tracing

Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Displays the purpose of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, the information in this box cannot be changed. However, if **Insulation Specification** is manually defined, select the purpose of the insulation in this box. Available purposes are read from the reference data.

Insulation Material

Specifies the material of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, this field cannot be changed. However, if **Insulation Specification** is manually defined, select the insulation material from those available from the reference data.

The list contains the last five insulation materials selected. Click **More** to browse the catalog for the insulation material to use. If you set this field to **Not Insulated**, the **Insulation Thickness** field is disabled. If you set this field to **Use Run Material**, the along leg feature inherits the insulation material from the duct run.

To change the options on the list, edit the **Insulation Material** select list in Catalog.

Insulation Thickness

Specification box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of temperature (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius, for example).

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

See Also

Pipe Straight Feature Properties Dialog Box (on page 294)

Pipe Surface Mount Feature Properties Dialog Box

Displays surface mounted component properties for review and editing.

General Tab (Pipe Surface Mount Feature Properties Dialog Box) (on page 298) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Pipe Surface Mount Feature Properties Dialog Box)

Displays and defines the general properties of the selected surface mounted component.

Pipe surface mounted component properties are divided into different categories: **Standard**, **Insulation and Tracing**, and **Surface Treatment and Coating**. You select which category that you want to define values for by using the **Category** option.

Standard

Pipeline

Displays the pipeline system to which the surface mounted component belongs. You cannot change the pipeline of the surface mounted component.

Pipe Run

Displays the pipe run to which the surface mounted component belongs. You cannot change the pipe run of the surface mounted component.

Specification

Specify the active pipe specification for the surface mounted component. All pipe specifications that are allowed for the pipeline display for selection. If appears in the box, the pipe specification is inherited from the pipe run to which the surface mounted component belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run Specification**.

Nominal Diameter

Specify the nominal diameter (NPD) of the surface mounted component. If appears in the box, the NPD for the surface mounted component is inherited from the pipe run to which the surface mount feature belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run NPD**. If you have manually selected the part, the NPD of the selected part appears and cannot be changed.

Type

Displays the types of surface mounted components allowed by the selected **Specification** and **Nominal Diameter**. Surface mounted components are listed by short codes. You can change the component type if needed. If you have manually selected the part from the catalog, **Type** displays as **Part selected manually** and cannot be changed.

Option

Displays a list of available surface mounted components. The software generates this list based on the pipe specification, the NPD, and the short code you selected in the **Type** box. If you have manually selected the part from the catalog, **Option** displays as **Part selected manually** and cannot be changed.

Base Part Name

Displays the part name for the surface mounted component. The part name is selected by the software using the pipe specification guidelines. Select **Select Manually** to override the pipe specification, and select the part number from the catalog. If you select a part manually, the **Nominal Diameter**, **Type** and **Option** properties are disabled.

NOTE The **Select Manually** option may not be available. It is enabled and disabled in the reference data.

Rotation Angle

Specifies the rotation angle of the surface mounted component around the pipe.

Correlation Status

Displays whether the surface mounted component has been correlated to a pipe end feature in a P&ID.

Correlation Basis

Specifies if the surface mounted component is correlated to a P&ID surface mounted component. Select **Correlate object** if the surface mounted component has a correlating surface mounted component in a P&ID. Select **No correlation is required** if the surface mounted component does not have a correlating pipe run in a P&ID.

Correlation Approval Status

Specifies if the surface mounted component is approved with discrepancies in the three-dimensional data compared with design basis data. Select **Topology mismatch approved** if the surface mounted component topology mismatch can be ignored. Select **Data and Topology mismatches approved** if the surface mounted component data and topology mismatches can be ignored. Select **None** if you do not want to approve a mismatch

Insulation and Tracing

Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Displays the purpose of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, the information in this box cannot be changed. However, if **Insulation Specification** is manually defined, select the purpose of the insulation in this box. Available purposes are read from the reference data.

Insulation Material

Specifies the material of the insulation. If **Insulation Specification** is set to use the insulation defined by the equipment object, this field cannot be changed. However, if **Insulation Specification** is manually defined, select the insulation material from those available from the reference data.

The list contains the last five insulation materials selected. Click **More** to browse the catalog for the insulation material to use. If you set this field to **Not Insulated**, the **Insulation Thickness** field is disabled. If you set this field to **Use Run Material**, the along leg feature inherits the insulation material from the duct run.

To change the options on the list, edit the **Insulation Material** select list in Catalog.

Insulation Thickness

Specifies the thickness of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Thickness** box.

However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of temperature (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius, for example).

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

Pipe Turn Feature Properties Dialog Box

Displays elbows, pipe bends, and other turn properties for review and editing.

Delete a Turn (on page 122)

Edit Turn Feature Properties (on page 119)

Move a Turn (on page 110)

General Tab (Pipe Turn Feature Properties Dialog Box) (on page 303)

Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Pipe Turn Feature Properties Dialog Box)

Displays and defines the general properties of the selected elbow or pipe bend.

NOTE Turn features inherit some properties from the parent pipe run. If you change the pipe run property, the corresponding turn properties also automatically change.

Pipe turn feature properties are divided into several different categories: **Standard**, **Insulation and Tracing**, and **Surface Treatment and Coating**. Select the category that you want to define values for by using the **Category** option.

Standard

Pipeline

Displays the name of the parent pipeline. This property is read-only.

Pipe Run

Specify the pipe run to which the turn belongs. Other pipe runs in the same pipeline as the original pipe run appear for selection.

Specification

Specify the active pipe specification for the turn. All the pipe specifications that are allowed for the System parent of the pipe run display for selection. If appears in the box, the pipe specification is inherited from the pipe run to which the turn belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run Specification**.

Nominal Diameter

Specify the nominal diameter (NPD) of the turn. If appears in the box, the NPD for the turn is inherited from the pipe run to which the turn belongs. If the icon does not appear, and you want to use the pipe specification from the pipe run, select **Use Run NPD**. If you have manually selected the part, the NPD of the selected part appears and cannot be changed.

Type

Displays the types of turns allowed by the selected **Specification** and **Nominal Diameter**. Turns are listed by short codes. You can change the turn type if needed. If you have manually selected the part, this box displays **Part selected manually** and cannot be changed.

Option

Displays a list of available turns. The software generates this list based on the pipe specification, the NPD, and the short code you selected in the **Type** box. For example, if you selected a **90E Default** in the **Type** box and more than one elbow works in this pipe run, the elbows appear here for selection. If you have manually selected the part, this box displays **Part selected manually** and cannot be changed.

Base Part Name

Displays the part name for the turn. The part number is selected by the software using the pipe specification guidelines. Select the **Select Manually** option to override the pipe

specification, and select the part number from the catalog. If you select a part manually, the **Nominal Diameter**, **Type** and **Option** properties are disabled.

Angle

Displays the angle of the turn feature. The angle is measured from the imaginary extension of the run.

Bend Radius Multiplier

Specify the bend radius multiplier for the selected bend. This overrides the default bend radius multiplier defined in the piping specification. This field is not available unless the **Pipe Bend Radius By User** option is set to **Pipe Bend Radius By User Is Enabled** in Catalog. You can find the option in Catalog under the **Piping > Piping Specification > Model Options** node in the tree view.

Correlation Status

Specifies whether or not the object has been correlated to an object in a P&ID. The list is defined by the EFWCorrelationStatus select list.

Correlation Basis

Specifies whether or not the object is correlated to a P&ID object. The list is defined by the EFWCorrelationBasis select list.

Correlate Object indicates that the object has a correlating object in a P&ID.

No correlation is required indicates that the object does not have a correlating object in a P&ID. **Correlation Approval Status**

Specifies whether or not the object is approved with discrepancies in the three-dimensional data compared with design basis data. The list is defined by the EFWCorrelationApprovalStatus sheet in the AllCodelist workbook.

Topology mismatch approved indicates that the object topology mismatch can be ignored.

Data and Topology mismatches approved indicates that the object data and topology mismatches can be ignored.

None indicates that you do not approve a mismatch.Insulation and Tracing Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Specifies the purpose of the insulation. If you selected **Not Insulated** in the **Insulation**

Specification box, you cannot change the information in the **Insulation Purpose** box. However, if **Insulation Specification** is manually defined, you can select the purpose of the insulation in this box. If **Insulation Specification** is a selected reference data insulation specification, the software reads the purpose from the insulation specification from the reference data and displays it here.

To change the options on the list, edit the **Insulation Purpose** select list in Catalog.

Insulation Material

Specifies the material of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Material** box. However, if **Insulation Specification** is manually defined, you can select the insulation material to use. If **Insulation Specification** is a selected reference data insulation specification, the software reads the material from the insulation specification as defined in the reference data and displays it here.

Select **More** to select an insulation material from the Catalog. To change the options on the list, edit the **Insulation Material** select list in Catalog.

Insulation Thickness

Specification box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Select the heat-tracing medium to apply to the object. If you want to add, edit, or remove values that are available for selection, edit the **Heat Tracing Medium** select list in the Catalog task.

Heat Tracing Medium Temperature

Specify the temperature of the heat-tracing medium. Include the temperature unit of measure, K for Kelvin, F for Fahrenheit, or C for Celsius for example, when specifying this value.

Surface Treatment and Coating

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

See Also

Pipe Turn Feature Properties Dialog Box (on page 302)

Pipe Weld Properties Dialog Box

Displays weld properties for review and editing.

Edit Weld Properties (on page 128) General Tab (Pipe Weld Properties Dialog Box) (on page 307) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Pipe Weld Properties Dialog Box)

Displays and defines the general properties of the selected weld. Properties are defined in the reference data.

Weld properties are divided into different categories: **Standard** and **Testing**. You select which category that you want to define values for by using the **Category** option.

Standard

Name

Displays the name of the weld. The weld name is based on the **Name Rule** selection. If you want to type a new name for the weld, then type a name for the weld in the **Name** box. If you do specify the name of the weld yourself, do not include spaces in the weld name.

Name Rule

Specify the naming rule that you want to use to name this weld.

Class

Specifies the weld class. To change the options on the list, edit the **Weld Type** select list in Catalog.

Type

Specifies the weld type. Valid types are listed in the **AllCodeLists.xls** workbook on the **Weld Type** sheet. If appears in the box, the weld type is inherited from the pipe run to which the weld belongs. If the icon does not appear, and you want to use the weld type from the pipe run, select **By Rule**.

Welding Procedure Specification

Specifies the welding procedure specification.

Materials Category

Specifies the materials category for the weld. To change the options on the list, edit the **Materials Grade** select list in Catalog.

Materials Grade

Specifies the materials grade for the weld. To change the options on the list, edit the **Materials Grade** select list in Catalog.

Gap

Specifies the gap between the welded ends of the welded joint.

Pass Length

Specifies the weld length.

Thickness

Specifies the weld thickness.

Height

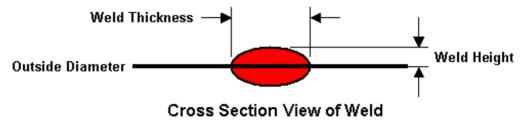
Specifies the weld height.

Owning Part

Select the component that owns the weld. The weld displays on the parent component's isometric sheet.

Sequence ID

Specifies the object sequence ID.



Testing

Testing Requirements

Specifies the type of non-destructive testing required for welds. To change the options on the list, edit the **Testing Type** select list in Catalog.

Testing Type

Specifies the type of non-destructive weld testing for the welds. To change the options on the list, edit the **Testing Type** select list in Catalog.

Testing Percentage

Specifies the percentage of the welds on this pipe run that are to be tested. This option is available only if you are viewing pipe run properties.

See Also

Pipe Weld Properties Dialog Box (on page 307)

Pipeline System Properties Dialog Box

Displays pipeline system properties for review and editing.

General Tab (Pipeline System Properties Dialog Box) (on page 309) Specifications Tab (Pipeline System Properties Dialog Box) (on page 310) Default Property Values Tab (Pipeline System Properties Dialog Box) (on page 310)

See Also

Edit Pipeline Properties (on page 118)

General Tab (Pipeline System Properties Dialog Box)

Displays and defines the general properties of the selected pipeline.

Name

Specifies the name of the pipeline. This name is usually generated by the active name rule. You can type a different name for the pipeline if you want. The name must be unique throughout the life cycle of the plant.

Name rule

Specifies the name rule used to generate the name. Set this option to **User Defined** if you want to specify the name yourself.

Type

Displays the type of object. On the **Pipeline Properties** dialog box, the type is **Pipeline System**.

Parent System

Displays the system to which the pipeline belongs. You can change the parent system of the pipeline if needed.

Description

Type a general description of the pipeline.

Sequence Number

Specifies the identification number Smart 3D assigned to the selected pipeline system when it was created. This option is only available when you view the properties of a pipeline system.

Fluid Requirement

Specifies the fluid requirement for the pipeline system. To change the options on the list, edit the **Fluid Code** select list in Catalog. This option is only available when you view the properties of a pipeline system.

Fluid Type

Specifies the fluid type for the selected pipeline system. To change the options on the list, edit the **Fluid Code** select list in Catalog. This option is only available when you view the properties of a pipeline system.

Correlation Status

Specifies whether or not the object has been correlated to an object in a P&ID. The list is defined by the EFWCorrelationStatus select list.

Correlation Basis

Specifies whether or not the object is correlated to a P&ID object. The list is defined by the EFWCorrelationBasis select list.

Correlate Object indicates that the object has a correlating object in a P&ID.

No correlation is required indicates that the object does not have a correlating object in a P&ID.

Correlation Approval Status

Specifies whether or not the object is approved with discrepancies in the three-dimensional data compared with design basis data. The list is defined by the EFWCorrelationApprovalStatus sheet in the AllCodelist workbook.

Topology mismatch approved indicates that the object topology mismatch can be ignored.

Data and Topology mismatches approved indicates that the object data and topology mismatches can be ignored.

None indicates that you do not approve a mismatch.

See Also

Pipeline System Properties Dialog Box (on page 309)

Specifications Tab (Pipeline System Properties Dialog Box)

Displays all the allowed specifications for the selected pipeline. You can define piping specifications in the reference data; refer to the *Piping Reference Data Guide* for more information. You can change which specifications are available for the pipeline by using the **Allowed Specifications** command in the System and Specifications task.

See Also

Pipeline System Properties Dialog Box (on page 309)

Default Property Values Tab (Pipeline System Properties Dialog Box)

Specifies the default piping specification, nominal diameter, and minimum slope for new pipe runs that are created in this pipeline system.

Standard

Specification

Select the pipe specification to be the default for pipe runs in this pipeline system. Only those pipe specifications that are allowed in the pipeline that you selected are listed. You assign pipe specifications to pipeline systems in the System and Specifications task. You define pipe specifications in the reference data. See the *Piping Reference Data Guide* for more information on defining pipe specifications.

Nominal Diameter

Specifies the nominal pipe diameter (NPD) to use for this pipe run. The pipe specification controls the available NPDs in this list. If you select an equipment nozzle as the starting point of your pipe run, the software automatically uses the NPD of the nozzle as the NPD of the pipe run. You can select the NPD units to display on a session file basis using the **Tools** > **Options** command on the **Units of Measure** tab.

Minimum Slope

Specifies the minimal slope value for the pipe run. You can specify the slope as a ratio, a percentage, or in degrees.

ratio - If a run drops 1/4" for every foot of horizontal distance, specify the slope as 1/4"/1'-0".

percentage - If a run drops 1" for every 10" of horizontal distance, specify the slope as 10%.

degrees - A five-degree slope can be specified as 5deg.

NOTE When routing a sloped pipe, use a slope value that is larger than the **Minimum Slope** for the pipe run to avoid *Invalid Slope Angle* To-Do-Record (TDR). The software compares design slope and minimum slope of the pipe run. If there is a difference between the values caused by any modification, the software generates a TDR.

Insulation and Tracing

Insulation Specification

Specifies the insulation specification for the object. If **Inherited Properties or Spec** displays in the box, the insulation specification for the object is inherited from the pipe run to which the object belongs.

Defines which insulation specifications are available for which systems in System and Specifications. Insulation specifications are defined in the reference data.

Not Insulated disables the remaining insulation properties.

User Defined indicates that you can specify the remaining insulation properties using custom settings.

More displays a dialog box so that you can select an insulation specification from the reference data. The software then automatically enters information from that insulation specification.

Insulation Purpose

Specifies the purpose of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Purpose** box.
However, if **Insulation Specification** is manually defined, you can select the purpose of the insulation in this box. If **Insulation Specification** is a selected reference data insulation

specification, the software reads the purpose from the insulation specification from the reference data and displays it here.

To change the options on the list, edit the **Insulation Purpose** select list in Catalog.

Insulation Material

Specifies the material of the insulation. If you selected **Not Insulated** in the **Insulation Specification** box, you cannot change the information in the **Insulation Material** box. However, if **Insulation Specification** is manually defined, you can select the insulation material to use. If **Insulation Specification** is a selected reference data insulation specification, the software reads the material from the insulation specification as defined in the reference data and displays it here.

Select **More** to select an insulation material from the Catalog. To change the options on the list, edit the **Insulation Material** select list in Catalog.

Insulation Thickness

Specification box, you cannot change the information in the **Insulation Thickness** box. However, if **Insulation Specification** is manually defined, select the insulation thickness from those values allowed for the material in the reference data. If the value in the **Insulation Specification** field is a selected reference data insulation specification, the software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Temperature

Specifies the temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example) when specifying this value.

Heat Tracing Requirement

Indicates whether or not the equipment is heat-traced. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Type

Specifies the type of heat-tracing. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium

Specifies the heat-tracing medium to apply to the object. To change the options on the list, edit the **Heat Tracing Medium** select list in Catalog.

Heat Tracing Medium Temperature

Specifies the temperature of the heat-tracing medium. Include the unit of measurement of temperature (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius, for example).

Responsibility

Cleaning Responsibility

Specifies the party responsible for cleaning the object. To change the options on the list, edit the **Cleaning Responsibility** select list in Catalog.

Design Responsibility

Specifies the party responsible for designing the object. To change the options on the list,

edit the Design Responsibility select list in Catalog.

Fabrication Responsibility

Specifies the party responsible for fabricating the object. To change the options on the list, edit the **Fabrication Responsibility** select list in Catalog.

Installation Responsibility

Specifies the party responsible for installing the object. To change the options on the list, edit the **Installation Responsibility** select list in Catalog.

Painting Responsibility

Specifies the party responsible for painting the object. To change the options on the list, edit the **Painting Responsibility** select list in Catalog.

Requisition Responsibility

Specifies the party responsible for ordering the object. To change the options on the list, edit the **Requisition Responsibility** select list in Catalog.

Supply Responsibility

Specifies the party responsible for delivering the object. To change the options on the list, edit the **Supply Responsibility** select list in Catalog.

Testing Responsibility

Specifies the party responsible for testing on the object. To change the options on the list, edit the **Testing Responsibility** select list in Catalog.

Testing

Testing Requirements

Specifies the type of non-destructive testing required for welds. To change the options on the list, edit the **Testing Type** select list in Catalog.

Testing Type

Specifies the type of non-destructive weld testing for the welds. To change the options on the list, edit the **Testing Type** select list in Catalog.

Testing Percentage

Specifies the percentage of the welds on this pipe run that are to be tested. This option is available only if you are viewing pipe run properties.

Surface Treatments and Coatings

Interior Surface Treatment Requirement

Specifies the interior treatment requirement for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Interior Surface Treatment Type

Specifies the interior treatment type for the object. To change the options on the list, edit the **Interior Surface Treatment** select list in Catalog.

Exterior Surface Treatment Requirement

Specifies the exterior treatment requirement for the object. To change the options on the list,

edit the Exterior Surface Treatment select list in Catalog.

Exterior Surface Treatment Type

Specifies the exterior treatment type for the object. To change the options on the list, edit the **Exterior Surface Treatment** select list in Catalog.

Cleaning Requirement

Specifies the cleaning requirement for the object. To change the options on the list, edit the **Cleaning Requirement** select list in Catalog.

Steamout Requirement

Specifies the steamout requirement for the object. To change the options on the list, edit the **Steamout Requirement** select list in Catalog.

Steamout Pressure

Specifies the steamout pressure for the object. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Steamout Temperature

Specifies the steamout temperature for the object. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Auxiliary Treatment Requirement

Specifies the auxiliary treatment requirement. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Auxiliary Treatment Type

Specifies the auxiliary treatment type for the object. To change the options on the list, edit the **Auxiliary Treatment** select list in Catalog.

Interior Coating Requirement

Specifies the interior coating requirement for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Type

Specifies the type of interior coating for the object. To change the options on the list, edit the **Coating Type** sheet in the **AllCodeLists.xls** workbook in the reference data.

Interior Coating Area

Specifies the area of the interior coating for the object.

Exterior Coating Requirement

Specifies the coating requirement for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Type

Specifies the type of coating for the object. To change the options on the list, edit the **Coating Type** select list in Catalog.

Exterior Coating Area

Specifies the area of the coating for the object.

Coating Color

Specifies the color of the object coating. To change the options on the list, edit the **Coating Color** select list in Catalog. Smart 3D includes this property in the painting area report.

Temperature and Pressure

★ IMPORTANT

- Temperature and pressure values are controlled by UndefinedServiceLimitsruleOpt, which is available on the DefaultProjectOptions sheet in the Piping Specification.xls workbook. If this option is set to 5, then you must specify temperature and pressure values for all the pipe runs. If this option is set to 10, the software displays a warning: "No Temperature and pressure data has been defined for the pipe run being modeled. As a result, compliance with the temperature/pressure service limits as defined in the piping specification cannot be confirmed. Do you want to continue modeling the pipe run anyway?"
- If your pipe specifications are material-driven, it is still recommended that you specify at least one set of temperature and pressure values for the pipe run.

Design Maximum Temperature

Specifies the maximum design temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Design Minimum Temperature

Specifies the minimum design temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Design Maximum Pressure

Specifies the maximum design pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Operating Maximum Temperature

Specifies the maximum operating temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Operating Minimum Temperature

Specifies the minimum operating temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Operating Maximum Pressure

Specifies the maximum operating pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Testing Maximum Temperature

Specifies the maximum testing temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Testing Minimum Temperature

Specifies the minimum testing temperature. Include the temperature unit of measure (**K** for Kelvin, **F** for Fahrenheit, or **C** for Celsius for example).

Testing Maximum Pressure

Specifies the maximum testing pressure. Include the pressure unit of measure (psi for

pounds per square inch for example).

Design Minimum Pressure

Specifies the minimum design pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Operating Minimum Pressure

Specifies the minimum operating pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

Testing Minimum Pressure

Specifies the minimum testing pressure. Include the pressure unit of measure (**psi** for pounds per square inch for example).

See Also

Pipeline System Properties Dialog Box (on page 309)

Reference 3D Pipe Properties Dialog Box

Displays Reference 3D pipe properties. Reference 3D object properties are read only.

General Tab (Reference 3D Pipe Properties Dialog Box) (on page 316) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Reference 3D Pipe Properties Dialog Box)

Name

Displays the name of the pipe in the Reference 3D model.

Layer Name

Displays the layer name on which the pipe is contained.

Short Material Description

Displays the short material description for the pipe. The software uses this description in the bill-of-materials part of isometric drawings, for reporting, and for visual feedback to the piping designer for design, construction, and fabrication.

Contractor Commodity Code

Displays the contractor commodity code. This code is used during the design phase.

Component Name

Displays the description of the piping component.

Primary Size

Displays the fitting size (NPD) of the first piping point.

Secondary Size

Displays the fitting size (NPD) of the second piping point.

Option

Displays a list of options that you can use instead of the selected object. If no options exist,

this field just displays **Default**. The Option list contains any options defined in the piping specification for the short code selected in the Type list. For example, if you are looking at a valve part, the Option list contains other valve parts, such as one with a higher pressure rating, that you can use here.

Type

Displays the object's short code. The short code is based on the piping specification and nominal diameter of the object selected along with the geometry at the insertion location.

Dry Weight

Displays the dry weight of the object.

Design Maximum Pressure

Displays the maximum allowable pressure for the pipe.

Design Maximum Temperature

Displays the maximum allowable temperature.

Flow direction

Displays the direction of the fluid flow for the pipe.

Pipe Run Name

Displays the name of the pipe run associated to the pipe.

Spool Name

Displays the name of the piping spool it belongs to.

Nominal Diameter

Displays the nominal pipe diameter (NPD) of the pipe.

Operating Pressure

Displays the operating pressure of the pipe.

Operating Temperature

Displays the operating temperature of the pipe.

Geometry Industry Practice

Displays the source industry standard used in the preparation of the pipe catalog data.

Stock Part Length

Displays the length of the pipe.

Stock Part Cut Length

Displays the cut length of the pipe. Flared lap lengths; and bending elongation, grip, and pull lengths are not applicable to the cut length calculation for a given pipe and are therefore ignored for that pipe.

Fabrication Requirement

Displays whether or not the pipe requires fabrication.

Fabrication Type

Displays the fabrication code for the pipe.

Construction Status

Displays the construction status of the pipe placed in the model. The default construction status is **New**.

Construction Status 2

MTO Reporting Requirements

Displays the reporting requirements for the object, whether the object is reported or not reported.

MTO Reporting Type

Displays the reporting type. The reporting type displayed depends on the Reporting Requirement you choose.

Geometry Industry Standard

Displays the code that represents the source used in the preparation of the catalog data applicable to the object.

Source object type

Displays the name of the type of object.

Reference 3D Pipe Run Properties Dialog Box

Displays Reference 3D pipe run properties. Reference 3D object properties are read-only.

General Tab (Reference 3D Pipe Run Properties Dialog Box) (on page 318) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Reference 3D Pipe Run Properties Dialog Box)

Displays the standard properties of the Reference 3D pipe run. Reference 3D object properties are read-only.

Name

Displays the name of the pipe run.

Flow Direction

Displays the direction of the fluid flow for the pipe run.

Piping Materials Class

Displays the piping material class short code for the pipe run.

Nominal Diameter

Displays the nominal pipe diameter (NPD) of the pipe run.

Normal Design Temperature Max

Displays the maximum design temperature in unit of measure, K for Kelvin, F for Fahrenheit or C for Celsius.

Normal Design Pressure Max

Displays the maximum design pressure in unit of measure, psi for pounds per square inch.

Insulation Purpose 3

Displays the thickness of the insulation. The software reads the thickness from the insulation specification from the reference data and displays it here.

Insulation Composite Material

Total Insulation Thickness

Displays the thickness of the insulation. The software reads the insulation thickness for the material in the reference data.

Insulation Temperature

Displays the insulation temperature in unit of measure, K for Kelvin, F for Fahrenheit, or C for Celsius.

SP3D System Path

Layer Name

Displays the layer name on which the pipe run is contained.

Source object type

Displays the name of the type of piping object.

Reference 3D Pipe Nozzle Properties Dialog Box

Displays Reference 3D pipe nozzle properties. Reference 3D object properties are read only.

General Tab (Reference 3D Pipe Nozzle Properties Dialog Box) (on page 319) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Reference 3D Pipe Nozzle Properties Dialog Box)

Name

Displays the name of the nozzle in the Reference 3D model.

Layer Name

Displays the name of the layer in which the nozzle is contained.

ID

Displays the description of the nozzle.

Port Index

Displays the port index number from the Reference 3D model.

Termination

Displays the termination class for the nozzle.

NPD

Displays nominal pipe diameter value and units of the nozzle.

End Preparation

Displays the end preparation code for the nozzle port.

Pressure Rating

Displays the pressure rating of the nozzle port.

Pressure Rating Standard

Displays the pressure rating standard for the nozzle port.

Schedule Thickness

Displays the short description or code that represents the thickness for the piping nozzle.

End Standard

Displays the end standard for the nozzle port.

Flow Direction

Displays the flow direction for the port.

Source object type

Displays the name of the type of object.

Reference 3D Piping Component Properties Dialog Box

Displays Reference 3D piping component properties. Reference 3D object properties are read only.

General Tab (Reference 3D Piping Component Properties Dialog Box) (on page 320) Configuration Tab (on page 269) Relationship Tab (on page 278)

General Tab (Reference 3D Piping Component Properties Dialog Box)

Displays the standard properties of the Reference 3D piping component. All these properties are read-only.

Name

Displays the name of the piping component.

Bend Angle

Displays the pipe bend angle for the piping component. For example **90 deg**.

Bend Radius

Displays the pipe bend radius for the piping component.

Face To Face Dimension

Displays the distance between port1 face to port2 face.

Heat Tracing Requirement

Displays whether or not the piping component is heat-traced.

Tracing Max Temperature

Displays the maximum heat-tracing temperature of the piping component.

Inspection ISO ID

Displays the inspection ISO ID of the piping component in the reference model.

Insulation Specification

Displays whether or not the piping component is insulated.

Insulation Purpose 1

Displays the purpose of the insulation.

Insulation Purpose 2

Displays the material of the insulation.

Insulation Purpose 3

Displays the thickness of the insulation.

Operating Temperature

Displays the maximum operating temperature of the piping component.

Schedule or Thickness

Displays the schedule thickness short description or code for the piping component.

Schedule Thickness 2

Outer Diameter

Displays the component's outer diameter for the piping port in units of measure, such as millimeters (mm) or inches (in).

Nominal Diameter

Displays the nominal diameter (NPD) of the piping component feature. The piping component feature is inherited from the pipe run which the component feature belongs.

Piping Model Code

Displays the piping model code for Smart 3D.

Piping Component Type 1

Displays the commodity type short code for the piping component.

Piping Component Type 2

Piping Commodity Option 1

Displays short code for the primary commodity object from the Piping job specification.

Piping Commodity Option 2

Commodity Specialty Type

Displays the short code for the piping commodity specialty type.

Valve Operator Type

Displays the code that represents the type of valve operator, actuator, or appurtenance used in the model. Valid codes are listed in the **AllCodeLists.xls** workbook on the **ValveOperatorType** sheet in the **Codelist Number** column.

Geometric Industry Practice

Displays the source industry standard used in the preparation of the pipe catalog data.

Geometric Industry Standard

Displays the name of the source, either an industry standard or a manufacturer, used in the preparation of the catalog data applicable to the piping component.

Valve Operator Class

Displays the valve operator class used by the piping component.

Operating Pressure

Displays the maximum operating pressure of the piping component.

Option

Displays a list of options that you can use instead of the selected object. If no options exist, this field just displays **Default**. The Option list contains any options defined in the piping specification for the short code selected in the Type list. For example, if you are looking at a valve part, the Option list contains other valve parts, such as one with a higher pressure rating, that you can use here.

Spool Name

Displays the name of the piping spool it belongs to.

Type

Displays the object's short code. The short code is based on the piping specification and nominal diameter of the object selected along with the geometry at the insertion location.

Commodity Code

Displays the commodity code for the penetrating spool.

Short

Displays the short code for the piping component.

Piping Component Type 3

Dry Installed Weight

Displays the dry weight of the piping component.

Fabrication Requirement

Displays whether or not the pipe requires fabrication.

Fabrication Type

Displays the fabrication code for the piping component.

Construction Status

Displays the construction status of the piping component placed in the model. The default construction status is **New**.

Construction Status 2

MTO Reporting Requirements

Displays the reporting requirements for the object, whether the object is reported or not reported.

MTO Reporting Type

Displays the reporting type. The reporting type displayed depends on the Reporting Requirement you choose.

Catalog Part Number

Displays the catalog part number associated with the piping component

Layer Name

Displays the layer name on which the piping component is contained.

Source object type

Displays the name of the type of object.

Reference 3D Piping Instrument Properties Dialog Box

Displays Reference 3D piping instrument properties. Reference 3D object properties are read only.

General Tab (Reference 3D Piping Instrument Properties Dialog Box) (on page 323) Configuration Tab (on page 269)

General Tab (Reference 3D Piping Instrument Properties Dialog Box)

Name

Displays the name of the instrument.

Bend Angle

Displays the pipe bend angle for the instrument. For example **90 deg**.

Bend Radius

Displays the pipe bend radius for the instrument.

Face To Face Dimension

Displays the distance between port1 face to port2 face.

Heat Tracing Requirement

Displays whether or not the piping component is heat-traced.

Tracing Max Temperature

Displays the maximum heat-tracing temperature of the piping component.

Inspection ISO ID

Displays the inspection ISO ID of the piping component in the reference model.

Insulation Specification

Displays whether or not the piping component is insulated.

Insulation Purpose 1

Displays the purpose of insulation. The software reads the purpose from the insulation specification from the reference data and displays it here.

Insulation Purpose 2

Displays the material of the insulation. The software reads the material from the insulation specification from the reference data and displays it here.

Insulation Purpose 3

Displays the thickness of the insulation. The software reads the thickness from the insulation specification from the reference data and displays it here.

Operating Temperature

Displays the maximum operating temperature of the piping component.

Schedule or Thickness

Displays the schedule thickness short description or code for the piping component.

Schedule Thickness 2

Outer Diameter

Displays the component's outer diameter for the piping port in units of measure, such as mm (millimeters) or in (inches).

Nominal Diameter

Displays the nominal diameter (NPD) of the piping component feature. The piping component feature is inherited from the pipe run which the component feature belongs.

Piping Model Code

Displays the piping model code for Smart 3D.

Piping Component Type 1

Displays the commodity type short code for the piping component.

Piping Component Type 2

Piping Commodity Option 1

Displays short code for the primary commodity object from the piping job specification.

Piping Commodity Option 2

Displays short code for the secondary commodity object from the piping job specification.

Commodity Specialty Type

Valve Operator Type

Displays the code that represents the type of valve operator, actuator, or appurtenance used in the model.

Geometric Industry Practice

Displays the source industry standard used in the preparation of the pipe catalog data.

Geometric Industry Standard

Displays the name of the source, either an industry standard or a manufacturer, used in the preparation of the catalog data applicable to the piping component.

Valve Operator Class

Displays the valve operator class used by the piping instrument.

Operating Pressure

Displays the maximum operating pressure of the piping instrument.

Option

Displays a list of options that you can use instead of the selected object. If no options exist, this field just displays **Default**. The Option list contains any options defined in the piping specification for the short code selected in the Type list. For example, if you are looking at a valve part, the Option list contains other valve parts, such as one with a higher pressure rating, that you can use here.

Spool Name

Displays the name of the penetrating spool.

Type

Displays the object's short code. The short code is based on the piping specification and nominal diameter of the object selected along with the geometry at the insertion location.

Commodity Code

Displays the commodity code for the penetrating spool.

Short

Displays the short code for the piping instrument.

Piping Component Type 3

Dry Installed Weight

Displays the dry weight of the piping component.

Fabrication Requirement

Displays whether or not the pipe requires fabrication.

Fabrication Type

Displays the fabrication code for the piping component.

Construction Status

Displays the construction status of the piping component placed in the model. The default construction status is **New**.

Construction Status 2

MTO Reporting Requirements

Displays the reporting requirements for the object, whether the object is reported or not reported.

MTO Reporting Type

Displays the reporting type. The reporting type displayed depends on the Reporting Requirement you choose.

Catalog Part Number

Displays the catalog part number associated with the reference 3D instrument.

Layer Name

Displays the layer name on which the piping component is contained.

Source object type

Displays the name of the type of object.

Reference 3D Pipeline System Properties Dialog Box

Displays Reference 3D pipeline system properties. Reference 3D object properties are read only.

General Tab (Reference 3D Pipeline System Properties Dialog Box) (on page 326)

Configuration Tab (on page 269)

Relationship Tab (on page 278)

General Tab (Reference 3D Pipeline System Properties Dialog Box)

Displays the standard properties of the Reference 3D pipeline system. All these properties are read-only.

Name

Displays the name of the pipeline system.

Layer Name

Displays the layer name in which the pipeline system is contained.

Fluid System

Displays the fluid system to which the pipeline system belongs.

Fluid Code

Displays the short code for fluid type intended to flow in the selected pipeline system. The **Fluid Code** select list (codelist) defines the fluid codes available for use in the model

Sequence Number

Displays the identification number that is assigned to the selected pipeline system when it is created.

Source object type

Displays the name of the type of object.

Glossary

abstract part

A part that is only defined by a partial specification and that cannot be materially provided by the organization that defines the specification.

Active Template Library (ATL)

Set of class templates and wizards supplied with Microsoft C++ Version 5.0 and later. You can use an ATL when you create ActiveX controls and any other type of object that uses the Component Object Model (COM) model. Using an ATL is generally preferred over Microsoft Foundation Classes (MFC), because the implementations are smaller, easier to use, and more closely tied to the COM model.

actuator

A device used to operate a valve using electric, pneumatic, or hydraulic pressure.

angle

The circular measurement taken from the intersection of two pipes at a turn or branch.

approval state

Recorded state of acceptance of information contained in objects within the database. The approval states indicate a level of confidence in the information stored in the database and govern your ability to alter specific data about a product.

arrangement (accommodation)

Those components of a system arranged in three-dimensional space with accurate dimensional representation for installation. Various types include electrical, HVAC, machinery, outfitting, and piping.

arrangement (piping)

Components of a piping system arranged in three-dimensional space with accurate dimensional representation.

attribute

A single type of non-graphics information that is stored about an object such as diameter or end preparation.

axis

An imaginary line used to define the orientation of a system or object normally defined in terms of an x-, y-, and z-axis. Some 3-D graphic objects have an associated axis used to define the center or axis for rotations.

basic design

Engineering definition of the model and its systems.

bill of material (BOM)

Hierarchical decomposition of a product into constituent assemblies and parts. Specific types of BOMs exist (for example, an EBOM is a bill of material from the point of view of an engineering department; an MBOM is a bill of material from the point of view of manufacturing).

branch point

A place where at least three segments of pipe intersect or where a pipe run extends out of a header.

bulkload

The process by which reference data in Microsoft Excel workbooks is loaded into the Catalog database.

catalog

Repository of information about components and materials used in construction. When you use catalog parts in the model, the software places an occurrence of the catalog part in the project. This occurrence is a copy of the actual catalog part.

Catalog database

The database that contains the reference data. Each model database can reference a different Catalog database.

chain

A set of continuous and tangent segments.

change history

Process of recording information such as who, when, and why for any given modification.

change management

Software features or manual procedures for managing the consequence of change. For example, software can support a change management feature to report drawings that need updating as a result of a change in a 3-D model.

change propagation

Ability of the software to intelligently modify dependent design information to reflect change in a higher order object.

class

Grouping of individual objects that share some very significant, common characteristics.

classification folder

A folder in the Catalog hierarchy that contains part classes. Classification folders are one level above part classes. The ClassNodeType and R-ClassNodeDescribes sheets in the Microsoft Excel workbooks define the classification folders.

codelist

A set of acceptable values for a particular property that can be referred to by an index number or selected in a combo box. For example, the codelist for the material specification allows you to select from a set of standard entries, such as ASTM A183-F316 Stainless Steel.

commodity code

A user-defined code that provides an index to parts in a catalog.

commodity item

A standard component found in a manufacturer catalog (an off-the-shelf component).

component

Physical part that a feature generates.

concurrent access

Ability of the software to allow multiple users to simultaneously access and modify the design of a model.

consolidated tasks

A collection of tasks run in batch. For example, the software allows you to extract a set of drawings immediately or to schedule the batch extraction for a future time.

constraints

A logical restriction that controls how part symbols ports relate to each other and to reference ports. There are four constraints: parallel, perpendicular, coincident, and distance.

contract

A Work Breakdown Structure object representing a scope of work, usually performed by an external supplier. The contract is related to a project and appears in the Work Breakdown Structure hierarchy.

coordinate

The location of a point along the X-, Y-, or Z-axis.

coordinate system

A geometric relation used to denote the location of points in the model. The most common coordinate system is the rectangular coordinate system, whereby points are located by traversing the X-, Y-, and Z-axes of the model. Normally, coordinate systems have their origin defined as 0,0,0.

critical flow

The state of flow for a given discharge at which the specific energy is minimum.

cutting plane

A plane that cuts through an object.

d/D

The maximum ratio of flow depth over pipe diameter.

damage records

Data relating to the damage and repair of structure or components that occurred during or after construction of a plant.

data interchange

Capability to output the design, or portions of the design, in a standard format for use or movement to another computer software system.

database

Repository for the product model data. The database contains information to describe individual objects in the data model and the relationships between objects as appropriate.

database backup

Process of recording a backup copy of the complete database or the incremental changes after the date that the last complete copy was created.

database break and recovery

Utilities used to restore a database after files are corrupted.

database copy

Functionality to copy large collections of model objects from one design project to another design project.

database management

Functionality related to managing a product model database.

database monitor record

Transactions that occur in order to provide database (DB) recovery after a stop in response with a minimum of lost data.

degree

The highest polynomial factor in the curve or surface mathematical definition. A line is a degree 1 curve, while a cubic B-spline is a degree 3 curve.

design alternative

Difference in a design represented by a separate version. A design alternative can be a new design prepared as a proposed change, or one of several elective options that the builder or customer selects. Each design alternative has an identification assigned so you can uniquely refer to the design alternatives.

design approval log

Record of review and approval of parts of the design.

design data auto input

Automation in loading existing design data into a new design database.

design documents

Drawings, sketches, material lists, procedures, and so forth that are generated during the design phase.

design object

Any object with properties that you can select. A design object can be related to one or more contracts of different types, but related only to one contract of a given type.

design progress check

Analysis of the content of the design to some metric unit that gives an idea of the degree of completion.

design review

Functionality to support rapid viewing of the design and markup of features with comments.

design service

Any general system services related to the design function.

design standard

Feature or object used in plant design that has been determined to the normal or approved way of accomplishing a design requirement. In the context of computer software, the term refers to computer functionality to support standards, not the standard itself.

detail schedule

Lowest level of schedule used to manage and track work progress.

distributed systems

Systems consisting of sequential parts with a distributive characteristic (for example, pipes distribute fluids, HVAC distributes air, cabling distributes power, and structure distributes loads).

distribution systems

Term synonymous and used interchangeably with the term distributed systems.

documentation

Drawings and other records that you must produce to document, obtain approval, or build the design.

drawing tool

Tool that helps in the process of creating, modifying, or manipulating objects. Examples are PinPoint and SmartSketch.

easting

A term that describes an east coordinate location in a coordinate system.

edge

A topological object that represents a trimmed curve bounded by a start and end vertex.

edge distance

The distance from the center of a bolt or rivet to the edge of a plate or flange.

equipment catalog

Catalog of equipment geometry and limited properties that the software uses to identify and visualize equipment and its placement in the model. The catalog is not the source for the total specification and ordering data for the object.

exit elevation

The lowest downstream elevation point on the internal diameter of a pipe.

fabricate

To cut, punch, and sub-assemble members in the shop.

face-to-face

The overall length of a component from the inlet face to the outlet face.

fasteners

Bolts and rivets used to connect structural members.

element

Primitive geometric shape such as a line, circle, or arc.

feature

A logical collection of parts driven by the piping specification. There are four basic features: straight, turn, branch, and inline component.

fence

Boundary or barrier that separates or closes off an area. To surround or close like a fence.

field adjustment

Material added to the neat design geometry of piping or structural parts to allow for fit up in the case that extra material is required due to uncontrolled variance in the manufacturing and construction process.

flat face

A flange surface on which the gasket sealing area is the entire surface from the inside face diameter to the outside face diameter.

flavor

A different variation of a symbol. Each variation has different occurrence property values.

flow rate

The quantity of fluid flowing per unit of time.

flow time

The time it takes for the flow, from the head of the piped system, to reach a downstream point.

fluid flow analysis

Computational fluid dynamics.

focus of rotation

A point or line about which an object or view turns.

full penetration weld

A type of weld in which the weld material extends through the complete thickness of the components being joined.

function points

Part of the requirements documentation, function points are the smallest granularity of a requirement statement that describe specific detailed actions that the software performs.

functional block diagram

Schematic representation of a system (piping, electrical, ventilation) showing system parts and their relationship. You use symbols to represent equipment and components. A connecting network of lines illustrates their relationship. Taken together, the symbols and the network illustrate the function of the system.

furnishings

Parts such as movable articles and fittings that normally are not associated with a system (for example, a chair).

gasket

A component used to seal a joint between two other components.

generic specific

Object that is parametrically defined or defined to suit a family of specific parts (for example, International Standards parametrics). For example, a 100 - 200 gpm pump in the catalog can provide a general shape to appear in the model until a specific object has been identified. See also specific and specific object.

GUIDs

Acronym that stands for Globally Unique Identifiers. The software automatically creates the GUIDs sheet in the Excel workbooks when you create the Catalog database and schema. The purpose of storing GUIDs within Excel workbooks is to help you keep track of what has been loaded into the database. Storing GUIDs also helps to avoid the situation in which a replacement Catalog database causes existing models to become invalid.

handwheel

A wheel-shaped operator intended to be turned by hand to operate the valve stem or operator shaft to which it is attached.

head loss

The loss of pressure due to friction or shape of a structure.

header

The portion of a pipeline topology associated with the primary fluid flow.

host location

The first location created for a Site. This host location is defined when the Database Wizard creates the Site database.

host server

The database server on which the Site database was created using the Database Wizard. Alternatively, if it is a restored database set, the Host Server is the database server where the Site database is restored. The Host Server in a Workshare environment contains the origin for the Site, Site Schema, Catalog, and Catalog Schema databases. Consequently, most Project Management and reference data work must take place at the Host.

implied piping component

Piping components that are created in the database as part of a feature, but that are not represented graphically.

initial design

Early stage of design work, generally before contract, used to estimate construction costs and provide a rough concept of the intended plant. Contains information relating to a plant created during its initial (concept) design period.

initial structural plan

Principal structural plan for the plant; also called a construction profile.

inline

A term used to refer to those piping components that can be inserted in a pipe feature.

instantiation

Occurrence of a catalog object at a specific geometric location in the model.

interference checking

A process that identifies possible collisions or insufficient clearance between objects in the model.

invert elevation

For a pipe, the lowest point on the internal diameter. For a ditch or trench, the bottom of the inside wall, or the top of the bottom slab.

job order

Industrial authorization for accomplishing work; synonymous with a work order.

kinematics analysis

Analysis of mechanical motion.

ksi

Kips per square inch.

leg length analysis

Preferred term is welding length analysis.

lever

A handle type operator.

library

Resource of reference information that you can access in developing a plant design.

life cycle database

Information developed to assist in the maintenance and modernization of delivered plants.

line

Maze of paths identifying connecting elements; synonymous with a network. Fluid comes in at one point and exits through all other connected points. See also pipeline.

link

Way to store information about another file in your document. You can update a link so that changes in the file appear in your document.

lintel

A horizontal member used to carry a wall over an opening.

load group

A grouping in which all components feature uniform load limits and stress safety characteristics. For example, if a pipe clamp from load group 5 has a maximum nominal load of 20kN, then so does a threaded rod from load group 5.

location

A Location is defined by three user-defined inputs: 1) a unique name, 2) a unique name rule ID, and 3) the server where the Site databases reside for that Location. A Location is defined and created when the Site database is created using the Database Wizard. Additional Locations can be created in the Project Management task. Each Location is a Site-level object, thus other Plants within the same Site collection can use the Locations when the Plants are configured for Workshare.

logical member

An object in the model used to represent the design topology.

lug (hangers and supports)

A plate with a bolt hole usually welded to the centerline of a pipe. Used to connect the pipe to the other parts of the hanger.

lug and eye piece lifting

Pads used to move structural assemblies.

machinery

Major pieces of equipment installed in a plant.

macro

A sequence of actions or commands that can be named and stored. When you run the macro, the software performs the actions or runs the commands. You can create the macros in Visual Basic or other OLE-aware programming applications. Some of the other OLE-aware programming applications are Visual Basic for Applications, Visual C++, and so forth.

maintenance envelope

A rectangular box around the part for clearance during maintenance operations.

maintenance records

Records of breakdown, repair, and overhaul of equipment.

material analysis

Analysis of a completed design work for extracting detailed material requirements; also called material lists.

material list

An option category that controls the format and content of the bill of materials.

methods

Objects in the database that describe the manufacturing methods to the component parts of a plant.

move from point

Starting point for an action. For example, when you move an equipment object, the Move From point determines the point of origin for the move.

move to point

Ending point for an action. For example, when you move an equipment object, the Move To point determines where you want the move to stop.

MTO neutral file

A non-graphic output file that can be fed into a material control system. MTO stands for Material Take-Off.

network

Maze of paths identifying connecting elements; synonymous with line. Fluid enters at one point and exits through all other connected points.

node

- One of the set of discrete points in a flow graph.
- A terminal of any branch of a network or a terminal common to two or more branches of a network.
- An end point of any branch or a network or graph, or a junction common to two or more branches.

northing

A term that describes a north coordinate location in a coordinate system.

nozzle

A piping connection point to a piece of equipment.

nozzle standout

The shortest allowable distance between the connection point of a nozzle and the start point of a turn on the leg connected to the nozzle.

NPD (Nominal Piping Diameter)

The diameter of a pipe.

object

A type of data other than the native graphic format of the application.

occurrence (of part or equipment)

Instantiation of a part of equipment in the model that refers to the part library; an instance of a specific object. The design can be built several times, and therefore the occurrence can apply to more than one hull. Typically, an occurrence points back to a specific object, either for its complete definition, as in the case of a particular valve, or for its made from material, as in the case of a steel plate part cut from sheets. Thus, when a designer selects a component from the catalog and places it at a location in the space of the plant, the software creates an occurrence of that object in the plant design.

occurrence property

A characteristic that applies to an individual object in the model. Occurrence properties are designated with 'oa:' in the reference data workbooks. You can view and modify occurrence properties on the Occurrence tab of the properties dialog boxes in the software. Depending on the object, some occurrence properties are read-only.

option

A predefined alternative to the default part in the pipe specification. There can be more than one option.

origin

In coordinate geometry, the point where the X-, Y-, and Z-axes intersect.

origin point

The point at which the coordinate system is placed, providing a full Cartesian coordinate system with positive and negative quadrants. Points are placed at coordinates relative to the origin point, represented by the X, Y, and Z values.

orthogonal

The characteristic of an element consisting completely of elements positioned at 90-degree angles. A square is an orthogonal element.

orthographic

A depiction of an object created by projecting its features onto a plane along lines perpendicular to the plane.

oversized spool

A spool with dimensions greater than the maximum allowed dimensions. You can define the maximum dimensions in the reference data.

P&ID

Diagram that shows the topology, functional components, and special requirements of a piping system; generally represents the engineering design of the system.

package

Set of closely related classes. (UML)

painting

Computation of paint surface and recording of paint system requirements.

parameter

A property whose value determines the characteristics or behavior of something.

part class

A group of similar objects. You can define part classes in the Excel workbooks. A part class can have multiple parts. For example, a heat exchanger part class can contain heat exchangers with different dimensions.

part number

Unique identifier of a part.

part override

An option used to place a component not defined in the pipe specification.

part ports

An intelligent connection point on a support part. Ports are used to connect parts together in a physically meaningful manner.

parts

The physical components that comprise a feature and are generally selected by the software. For example, the flanges, gaskets, and the gate valve itself are examples of the parts comprising the gate valve feature.

PDS (Plant Design System)

A comprehensive, intelligent, computer-aided design and engineering application for the process, power, and marine industries. PDS consists of integrated 2-D and 3-D modules that correspond to engineering tasks in the design workflow.

peak flow

The maximum flow rate of water through a specific size pipe.

penetration spool

A spool that can include parts from one or more pipeline systems. The common factor among all the systems is that each pipeline is welded to a common penetration plate.

PinPoint

Tool that allows you to place, move, and modify elements with precision, relative to a reference point.

pipe

Piping part that is hollow and approximately cylindrical; may have a constant cross section along its length. Pipe conveys a working media (fluid or gas).

pipe run

Type of interconnection where a single path through a portion of a piping system has a common specification, common property values, and one start and one end point.

pipe specification

A collection of the allowed types of piping commodities and requirements that can be used in the design of a piping system to which the specification applies. These commodities are also known as specification parts. Each individual piping specification includes additional rules that determine the types of parts that must be used in certain design circumstances as well as suggestions for parts that could be used in other circumstances.

pipe stress analysis

Analysis routines that provide stress and deflection data for piping designs. Loading conditions can be both static (thermal or displacement) and dynamic.

pipeline

A set of graphically connected pipe runs including all branches.

piping system

Type of distribution system that allocates and controls the dispersion of a working media (fluid or gas) among functional devices. The piping system may be comprised of other piping systems, parts, devices, pipelines, and pipe runs.

pneumatic test

A pressure test in which air is used to detect leaks in a component.

port

A connection point to a pipe or a component such as a valve.

principle of superposition

The principle that states that the stresses, strains, and displacements due to different forces can be combined. This principle is only valid for linear analysis.

Product Data Management (PDM) System

Software intended to manage both product data and documents associated to the product data. Functionality typically includes: object-based data modeling tools, user administration, business rules, and document management. Document management typically includes document editing or reviewing, document mark-up or redline, document storage, and full-text retrieval.

product structure

Hierarchical breakdown or decomposition of a product into constituent parts, volumes, or units. (For example, a bill of material is one possible type of product structure.)

production planning

Functionality associated with the work breakdown and sequence of the construction of a plant.

promotion

Process of associating approval state with a product version. A product version begins its existence at a working approval state. When the version is at some level of maturity, its approval state is elevated to a higher approval state (that is, promoted). Then, further changes must be carefully controlled and generally require the data set demoted to a working state. One or more promotions can occur successively higher approval states (between working and approved) to represent various intermediate levels of review or progressive approval.

query select sets

Set of objects that are selected in a query or queries on the database.

raised face

The raised area of a flange face that is the gasket sealing surface between two mating flanges.

reference data

The data that is necessary to design plants or ships using the software. Reference data includes graphical information, such as symbols. It also contains tabular information, such as physical dimensions and piping specifications.

resource estimation

Rough estimate of material, manpower, and facility utilization for the design and construction of the plant.

route

1) A line connecting a series of points in space and constituting a proposed or traveled route. 2) The set of links and junctions joined in series to establish a connection.

run

Line or a portion of a line with no change in material properties or purpose.

saddle

The multi-curved shape that appears when a pipe section is connected to another pipe section.

satellite server

The database server where the replicated databases reside for Workshare. The Satellite Server is not used unless Workshare is activated.

schedule

A system for indicating the wall thickness of a pipe. The higher the schedule number, the thicker the wall for a certain pipe size.

schema

A database that creates the structure of another database. For example, a schema specifies the queries, tables, fields, and data types in a database.

schema update utility

Functionality used to assist in processing existing product models to an updated database structure after you modify or add to the database structure.

site

The top level in the Project Management hierarchy. A Site configuration may contain several Catalogs, each shared by multiple Plants.

site administrator

Person responsible for managing the standards and general parameters for a given plant site within a Site database.

site setup

Functionality associated with establishing a new plant site or hull for design development.

sketch and trace

User interface for rough definition of a required design feature that typically works in a 2-D mode.

sleeve

A part that connects two pipes or two ducts, for example. A sleeve can be used to prevent water from leaking through a hole.

slope

The degree of incline, expressed as a ratio of the vertical rise to the horizontal run.

specific energy

Depth of flow plus velocity head.

specifications

Contracted requirements for the plant.

split

A feature that represents a break and a joint in the piping, for example, butt-weld, coupling, flange set, union, and so forth.

spool

A prefabricated portion of a piping system that is an assembly of fittings, flanges, and pipe. A spool does not include bolts, gaskets, valves, or instruments.

stem

A rod that transmits the motion from the operator to the closure element of the valve.

stud

A bolt, threaded on both ends, used to connect components.

suspended floor

A concrete floor system built above and off the ground.

symmetric node

Type of vertex on a curve. A curve with a symmetric node has the same curvature on each side of the node. A handle can be attached to a symmetric node for editing.

system

A conceptual design grouping that organizes parts in hierarchical relationships. A system represents a functional view of the model and includes information such as system name, type, properties, and design specifications for the objects assigned to the system.

tag number

User-specific, unique number assigned to an object (for example, CV-101 for a control valve, HE-2002 for a heat exchanger).

target point

The origin for coordinate measurements displayed by PinPoint. You can position the target point anywhere on the drawing sheet or view.

tolerant geometry

A type of ACIS geometry - either an edge or a vertex - that is outside the tolerance for ACIS and requires special handling.

trim

A common term that refers to the working parts of a valve and the associated materials.

trimmed surface

A surface whose boundary is fully or partially inside the "natural" geometric definition of the surface. Some or the entire control polygon extends outside the face boundary.

trunk

Feature that quickly reserves space for the distributive systems and other systems that have a path. Along the trunk are stations that define the cross section and identify part or system membership.

turn

A feature that represents an angular change in direction of a pipe run; for example, an elbow or an angle valve.

unit/module modeler

Facility of the system to structure collections of equipment and components into a single identifiable object.

user attributes

A customized property in the reference data. The Custom Interfaces sheets in the Excel workbooks define these properties. You can list the customized properties on the individual part class sheets.

valve

A component used to control the flow of fluid contained in a pipeline.

version control

Ability of the system to manage multiple versions of a single part of the design. Version control should support conditional analysis and promotion status, as well as alternate design features among hulls within a plant site.

vertex

A topological object that represents a point in the three-dimensional model.

viewset

Set of objects (usually a subset of the entire database) that a view operation uses. Membership or lack of membership for any object in a viewset does not affect the actual stored representation of the object, but only its availability or desirability for viewing in the current scenario.

weight and CG analysis

Routines that compute the weight of commodity materials as configured in a given design (for example, plate and pipe) and determine total weight and center of gravity (CG) for a collection of material and equipment, as well as the complete plant.

welding

Weld requirements for joining materials. Welding length analysis is the calculation of required weld dimensions; also called leg length analysis.

wirebody

A topological object that represents a collection of edges jointed at their common endpoints.

wizard

Software routine attached to an application that provides guidance and expert help to you to complete one of the functionalities of the application.

work content

Estimation development of metrics from the database that relates to the work hour content of the various construction units.

work order

Plant authorization for completing work; synonymous with a job order.

working plane

The available 2-D plane of movement for endpoint selection.

workset

Set of objects (usually a subset of the entire database) used in an interactive change, add, or delete operation. Membership or lack of membership for any object in a workset does not necessarily affect the actual stored representation of an object. However, you can change or delete an object in a workset that also results in a change or deletion of the stored object. Similarly, when you add a new object (not currently stored) to a workset, the software also adds the object container.

workspace

Area that represents the portion of the model data needed to perform the intended task and includes the user modeling settings.

workspace document

Document into which you can extract a portion of the model data for a user task.

Workspace Explorer

Tree or list representation of objects in your workspace.

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